ESSAYS ON TAX PREPARER IMPACT ON TAX REVENUE COLLECTION AND CODE COMPLIANCE

By

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by

Raymonda L. Burgman

To my nephews

ACKNOWLEDGMENTS

It is important to pray. Therefore, I am thankful for my own resilience. Several attributes can make a good education great. For example, if one receives a good education, it is possible to go to the fish market and buy fish. However, if one receives a great education, it is possible to go to the pond and catch as many fish as you need.

I feel as if I received a great education at the University of Florida. The scholars in the Department of Economics taught me to think and reason. There is a wealth of knowledge for a student to tap in the department. I was privy to a small portion of that knowledge.

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In Chapter 1, tax regulations and procedures have evolved into a complex system that requires professional training to ensure accurate completion of a federal tax return. Tax consultants continually update their knowledge to remain competitive. First, I discuss current tax policy, alternatives to the current system, and amendments to the current system. An exposition of the standards set by various professional organizations and the federal government for tax consultants follows.

In Chapters 2 and 3, the current tax evasion literature primarily investigates the relationship between the Internal Revenue Service and the taxpayer. Additional theoretical as well as empirical extensions into the impact that preparers have on taxpayer reporting behavior as well as governmental auditing are necessary. This dissertation develops an analytic model to investigate the relationship that tax preparers play in the tax reporting decision of taxpayers. The taxpayer and the tax agency play a sequential game where the taxpayer has the opportunity to seek advice about tax liability. The tax agency decides if an audit is appropriate. This dissertation solves the reporting and audit probabilities for the states of the world where advice is and is not available.

In Chapters 4 and 5, the empirical model investigates the evolving and important relationship that tax preparers play in the tax reporting decision of taxpayers. I use the 1994 Individual Public-Use Microdata File (IMF) to investigate why taxpayers seek the advice of tax professionals. I enhance the typical model with the inclusion of audit probabilities based on residence. The model also takes into consideration changes in the tax law since the Tax Revenue Act of 1986. The results based on employment status, age, marital status, and complexity. Tax law changes and audit probabilities also influence preparer use.

CHAPTER 1

THE TAX PREPARER'S ROLE IN THE PERSONAL INCOME TAX SYSTEM IN THE UNITED STATES: REFORM ISSUES AND ECONOMIC RESEARCH LITERATURE REVIEW

Tax Reform Issues

The Internal Revenue Service (IRS) is the largest bureau of the Treasury Department. "The IRS is responsible for determining, assessing, and collecting internal revenue in the United States. This revenue consists of personal and corporate income taxes, excise, estate, and gift taxes, as well as employment taxes for the nation's Social Security system" (http://www.ustreas.gov).

Reforming the tax collection process was a central concern of the presidential election of 1996 in the United States (Unites States Congress 1997). In late 1997, Congress addressed the problem when they questioned Internal Revenue Service (IRS) agents. Taxpayers accused the IRS of improper treatment during the audit process (Mintz 1997). One option would be to replace the complicated income tax structure with one of the following tax schemes: retail sales tax, value-added tax, flat tax, or personal consumption tax. Research on implementation of, compliance cost of, and the tax revenue generated from each program continues (Bakija and Slemrod 1996).

Each collection system has a different structure. The retail sales tax operates the same as the sales tax used by 45 of the 50 states. The value-added tax collects revenue based on the value of goods at each stage of production and distribution. The flat tax, the cornerstone of Steve Forbes' 1996 Republican presidential nomination campaign, says that each individual pays a single flat rate (Gale and Holtzblatt 1997). Lastly, the personal consumption tax taxes what one consumes during the year. To calculate tax liability, the taxpayer would subtract savings from income. The difference is the basis for any tax payments.

Others insist upon dismantling the IRS. They believe that the compliance cost associated with the current system is too large. The debate concerning the proper tax code and the future of the IRS continues while the current tax code continues to change. A question that one may ask is how does the current tax code affect the relationship between the IRS, tax preparers, and taxpayers. Chapters 2 through 5 discuss both theoretical and empirical investigations into this issue.

Tax policy in the form of tax burden issues, each citizen's level of tax liability, permeated the 2000 presidential election. Tax burden is a frequently revisited presidential topic. Adjusting the tax burden requires changing the current code and not drastic systemic changes. This is not the same as dealing with tax system complexity. There is a reluctance to deviate from the current system even though it is complex and robust.

Individuals may use a preparer to decrease their tax liability. However, the complexity generated from tax code adjustments may affect preparer use to a greater degree (Christian, Gupta, and Lin 1993). Tax preparers addressed how less complexity in the tax system may influence government revenue and taxpayer compliance (Ferguson 2000). The American Institute of Certified Public Accountants (AICPA) Tax Division, American Bar Association (ABA) Section of Taxation, and Tax Executives Institute (TEI) forwarded a joint resolution to the United States Congress asking for code simplification. The three groups highlighted 10 tax law areas that would benefit from reform.

Current Tax Policy

The tax system in the United States is special in that it is a voluntary system. Taxpayers report income levels, deductions, and exemptions to the IRS. Employers may provide the IRS with some income information, but taxpayers do retain some private information. The law allows individuals to hire tax preparers to assist them in deciphering the complicated and ever changing system. Tax preparer use is dependent upon several factors (Christian, Gupta, and Lin 1993; Collins et al. 1990; Hite and McGill 1992). Some people seek advice because their time cost of return preparation is great. If individuals are unfamiliar with the forms they need to file, they may seek advice. A self-employed worker is also more likely to require a preparer. The income level or marginal tax rate also has an impact on tax preparer use. There are five personal income tax brackets. They range from 15 percent for low-income levels to 39.6 percent for income over $256,000.[1] Taxpayers may have different motives for using a preparer. Either they are honest and simply trying to reduce uncertainty, or they are intentionally trying to evade proper payment of their tax liability.

Note the difference between tax evasion and tax avoidance. Tax evasion is the willful and knowledgeable use of illegal methods to reduce one's tax liability. Tax avoidance is the use of legal tax rules to lower tax payments. In the dissertation, I focus on tax avoidance. In other words, if audited a taxpayer may state that she was uncertain about whether her income profile allows for any special tax deductions or considerations under the law. She may feel that her position was reasonable. Yet, if IRS substantiates that the position was not reasonable, the tax court will find for the IRS and assess additional taxes and penalties (Krause 2000).

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[1] In 2001, the tax brackets changed.

Tax preparers offer general advice and/or tax preparation. Since it is not verifiable whether an individual simply received advice from a tax preparer, one can only identify returns prepared and signed by a third party. Statistics suggest that many audited returns are those handled by tax preparers (Klepper and Nagin 1989). It is difficult to understand if this is because the returns handled by tax preparers tend to be more complex. Alternatively, perhaps, this is due to deliberate attempts by tax preparers and taxpayers to deceive the IRS.

The IRS in recent years has attempted to induce preparers to advise clients only on tax rules (Stein 1997). Later, I will discuss tax attorney versus accountant professional ethics and responsibility. The IRS would like to reduce financial resource waste by taxpayers seeking to decrease tax liability. In other words, the IRS desires taxpayers to use a preparer if they have a legitimate need for one but to not use a preparer if they simply want to pay less taxes. Some preparers may find themselves compromising. The client who is paying for the tax preparation service believes that the preparer is her advocate.[2] In addition, the preparer must also adhere to the rules and regulations established by the IRS. Preparers are also subject to certain fines and penalties.

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[2] Tax preparers are advocates for their clients. It is required under the professional standards followed by certified public accountants and tax attorneys. The IRS circular 230 also assumes this. I discuss this further in a section below labeled "Tax Preparers, Ethics, and Standards."

Auditing Tax Returns

The government's audit process involves only a portion of the personnel at the Internal Revenue Service. In 1994, the IRS had approximately 110,000 employees. About 15,000 revenue agents and almost 2, 500 tax auditors carried out the wide range of audit operations. In deciding whom to audit, the IRS selects the largest percentage if its returns by using a computer program that measures the probability of tax error in each return. If the score is high, it is probable that the tax change will be high. Other individuals are selected on the basis of claims for refund, multi-year audits, related return audits, and other audits initiated by the IRS as a result of informants' information, special compliance programs, and the information document matching program.[3] In 1994, the IRS recommended additional tax and penalties on 1,225,707 individual returns totaling $5.3 billion. In 1996, the IRS recommended additional tax and penalties on 1,941,546 individual returns totaling $7.6 billion (http://www.excite.com/reference/almanac/?id=A0005925).

The literature on tax evasion began by investigating the relationship between the IRS and the taxpayer. This body of literature lacks extensive theoretical as well as empirical extensions into the impact that preparers have on tax revenue collection and tax evasion. I would like to examine those topics in chapters 2 through 5. In this chapter, I provide information about tax preparer standards and penalties for violation of those standards.

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[3] See Table 2-1 in Chapter 2 for audit selection reasons.

Tax Preparers, Ethics, and Standards

A profession, tax consulting, emerged from the United States tax system. Formal representation began near the outbreak of the Civil War and the institution of the first income tax to finance the war. The Office of the Commissioner of Internal Revenue formed in 1862. Citizens were making questionable claims about war losses. The Treasury Department provided discipline for attorneys as well as other agents.

The consultant must abide by the law described in Treasury Department Circular 230. This inclusive document covers the actions of lawyers, accountants, and other enrolled agents. It also sanctions the behavior of non-enrolled agents. In addition, separately, the legal and accounting professions have established ethical standards that carry some punitive damages from within the profession if the tax preparer does not abide by those standards.

Treasury Department Circular 230

The Internal Revenue Service provides a summary of Circular 230 in Publication 947 entitled "Practice before the IRS and Power of Attorney." It explains that the Director of Practice administers and enforces regulations governing practice before the IRS. The Director must monitor admission into practice and perform disciplinary meetings if necessary. An individual is practicing before the IRS is he or she:

☐ Communicates with the IRS for a taxpayer regarding the taxpayer's rights, privileges, or liabilities under laws and regulations administered by the IRS,

☐ Represents a taxpayer at conferences, hearings, or meetings with the IRS, or

- ☐ Prepares and files necessary documents with the IRS for a taxpayer.[4]

Practicing before the IRS is not preparing a return, providing information to the IRS, or appearing as a witness on the behalf of a taxpayer. Any individual can do this.

Attorneys, certified public accountants, enrolled agents, enrolled actuaries, non-enrolled return preparers, and other non-enrolled individuals may represent a taxpayer before the IRS if they file a written declaration that they are qualified and authorized to represent the taxpayer. The rules are similar for attorneys and certified public accountants (CPAs). These individuals cannot be under suspension or disbarment from practice before the IRS. For attorneys, they must be members in good standing of the bar of the highest court of any state, possession, territory, commonwealth, or of the District of Columbia. For CPAs, they must be qualified to practice as a CPA in any state, possession, territory, commonwealth, or of the District of Columbia. Any enrolled agent may practice before the IRS. Enrolled actuaries may also practice before the IRS if the Joint Board enrolls them as an actuary for the Enrollment of Actuaries. They can only practice within their area of expertise, typically, employee retirement plans.

Non-enrolled return preparers may also practice before the IRS. These individuals are not attorneys, CPAs, enrolled agents, or enrolled actuaries. They may prepare a return and may or may not sign that return. This individual may represent the taxpayer concerning the tax year that she acted as the return preparer. In addition, representation is limited to the Examination Division and not before the Appeals, Collections, or any other division of the IRS. There are other non-enrolled individuals (an individual, a family member, an officer of a corporation, a partner, an employee, or a fiduciary) that can practice before the IRS in special circumstances. Few individuals cannot practice before the IRS. Perhaps, they lost the privilege because of certain illegal activities.

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[4] Internal Revenue Service, Publication 947, last revised January 1999.

The Director of Practice may grant enrollment to an applicant with proficiency in the tax matters. Completing an examination or prior service or experience in the IRS can prove this proficiency. To enroll, an individual must complete a series of application forms and not have engaged in any conduct that would justify suspension or disbarment by the IRS. Form 2587 is an application for a special enrollment examination. The IRS revises the document annually. An applicant can also file Form 23 to apply for enrollment. It is an application for enrollment to practice before the IRS. It is possible to apply for a renewal with Form 8554. An individual must complete 72 hours of continuing professional education during the 3-year enrollment period to be eligible for renewal.

The preparer must adhere to specific rules. If an officer or employee of the Internal Revenue Service request documentation, the preparer must submit the documents. There is a limited confidentiality privilege, which may allow the preparer to be exempt from turning over the documentation. Completing an examination or prior service or experience in the IRS can prove this proficiency. This privilege is similar to the provision made available between a taxpayer and a lawyer. It holds for any federally authorized tax preparer and became effective for any communications after July 21, 1998. Protected communications are those that relate to no criminal tax matters before IRS and tax proceeding brought in federal court by or against the United States. There is no protection for corporate tax shelters.

The preparer tells clients of their compliance with revenue code, whether that be an error or omission. Preparers must also practice due diligence when preparing documents or determining the correctness of documents. A preparer cannot delay any matters before the IRS or get assistance from a disbarred or suspended preparer or former IRS employees.

Under no circumstance can a preparer be a party to any disreputable conduct. This includes committing a criminal offense under the revenue laws and giving false or misleading information in connection with federal tax matters. The IRS frowns upon the failure to file a tax return or remit tax payments. As with most legal matters, using coercion or bribery to influence official action of the IRS is not permissible. A preparer disbarred or suspended from service by any state, territory, or possession of the United States should not aid another to practice before the IRS. In general, any contemptuous conduct in connection with practice before the IRS and gross incompetence is illegal.

The penalty for such behavior may be a reprimand, disbarment, or suspension. The IRS also uses monetary penalties in extreme cases. The penalty is $250, which some question as a true deterrent to poor tax advice.

AICPA Code of Ethics and Statement on Responsibility in Tax Practice

The American Institute of Certified Public Accountants (AICPA) was vital to legitimizing accounting as a profession (Corley and Windahl 1980). To strengthen the profession, implementation of educational standards as well as standardized testing followed. Together these two steps insured the possibility of a licensing process. The accounting profession says to the public that each individual acquires and maintains a certain body of accounting knowledge, certification expresses that an individual can perform skills attributed to an accountant.

Independence, integrity, and objectivity are crucial to an accountant's performance (Corley and Windahl 1980). She must not subordinate professional judgment to others. This requires honest and objective conclusions. With regard to tax accountants, clients receive prompt notification of return errors. However, rules prohibit informing the IRS without the client's permission.

The CPA must be professionally competent (Corley and Windahl 1980). A practicing accountant understands the importance of continuing education. Revenue laws change annually. It is the individual's responsibility to remain informed and practice professional care. The Code of Ethics requires adequate planning and supervision. A CPA should know how long and what documents are necessary to execute a particular action. This means acquiring sufficient relevant data in connection with the engagement.

Provisions within the code are specific to tax accounting. If the preparer did not prepare the tax return, then no signature is necessary. She may sign the return if she reviewed or acquired knowledge equivalent to having prepared the return. Fees cannot be contingent upon tax savings, but fees can be contingent upon complexity. If someone refers a client, it is within professional ethics to continue the work. However, if a company asks an accountant to complete or review work began by another preparer, they should notify the original preparer. Advertising and indirect solicitation are permitted as long as it is considered within the public interest. One can not quote satisfied clients or compare one's services with those of another firm.

Literature Review: Tax Evasion and Tax Preparer Use

Allingham and Sandmo (1972) have been the foundation for a great number of tax evasion and avoidance studies.[5] This paper follows in the tradition of Becker's (1968) paper on the economics of crime. Using the expected utility paradigm, Becker analyzed crime and punishment. Criminal activity occurs if the expected gains from breaking the law outweigh the gains of some other activity. Allingham and Sandmo look at the relationship between taxpayer risk and detection probabilities and penalty structures to tax evasion. Tax declaration is a choice under uncertainty. The taxpayer does not know the outcome of an action. True tax liability reports or false reports are possible. The taxpayer observes if an audit occurs. The taxpayer that eludes the audit process gains more than an audited taxpayer does.

The structure and timing of the Allingham and Sandmo model is as follows. Taxpayer behavior conforms to Von Neumann-Morgenstern axioms of behavior under uncertainty. The only argument of cardinal utility is income. The taxpayer has a concave utility function. In effect, this is indirect utility with constant prices. The model assumes that marginal utility is positive everywhere and strictly decreasing. Thus, the taxpayer is risk averse. In addition, the government commits to a predetermined audit policy.

True tax liability, Y, is exogenous. The taxpayer knows his or her income while the tax agency does not. The tax function, $t\,(Y - E)$, embodies the simplifying assumption of a constant marginal income tax rate. The understatement in tax liability, E, is the taxpayer's decision variable. An investigation occurs with probability p. Detection and punishment of evasion occurs. If this happens, the taxpayer pays tax on the undeclared amount, $f\,[t\,(Y) - t\,(Y - E)]$, where f is the penalty function.[6]

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[5] T.N. Srinivasan (1973) also provides an early model of tax compliance.

There are a few major results from the model. A characterization of the optimal amount of evasion is that the marginal expected utility of the income gain due to successful evasion equals the marginal expected disutility of the penalty incurred if the tax agency detects evasion. The optimal level depends on an individual's attitude toward risk, as well as tax and penalty structures and probability of detection. If the penalty rate is greater than one, then as actual income increases, declared income also increases. When actual income varies, the fraction declared increases, stays constant or decreases according as relative risk aversion is an increasing, constant, or decreasing function of income. An increase in the penalty rate or the probability of detection leads to an increase in the fraction of income declared.

Tax evasion studies moved beyond the simple model first presented by Allingham and Sandmo.[7] The inclusion of a third party in the tax preparation process is most important. Cuccia (1994) and Andreoni et al. (1998) undertakes tax compliance literature reviews. Both mention the rather small amount of research that includes tax preparers.

Cuccia (1994) divides the tax preparer studies into three categories: uncertainty reduction regarding unambiguous income, ambiguity reduction or exploitation, and reduced preparation and enforcement costs. These studies contain both theoretical and empirical results.

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[6] This is tax underpayment.

[7] I list additional tax evasion studies in Chapter 2 "Previous Studies."

From a theoretical standpoint, in Scotchmer (1989), lower tax reports (net of penalties) were the result of reduction in uncertainty and an asymmetry of fines. Klepper, Mazur, and Nagin (1991) state that there is an increase for unambiguous income reported. Reinganum and Wilde (1991) state that a reduction in taxpayer compliance occurs because seeking advice shields the taxpayer from audit costs.

Melamud, Wolfson, and Ziv (1994) examine if tax credits should be used to encourage tax preparer use. They find that the subsidy should not be available to all taxpayers only a subset. If the government decided to initiate a policy where all taxpayers received a tax credit for using a preparer, it would not be Pareto optimal.

Beck, Davis, and Jung (1996) find no net effect on reported income. The tax preparer reduces the expected net revenue of the taxing authority by the inclusion of a tax preparer in the model.

In the model developed by Beck, Davis, and Jung (1996), the taxpayer can seek advice from a preparer who has knowledge of the tax-reporting arena. This model seeks to enhance the area of uncertainty reduction. It states that tax advice can serve as a signal that the tax agency may use to alter its auditing behavior. These policies in return affect the reporting behavior of taxpayers.

Statistics suggest that many audited returns are those handled by tax preparers (Klepper and Nagin 1989). The empirical results of Klepper and Nagin (1989) are that professionally completed returns tend to be more compliant when it comes to unambiguous items. They used the Taxpayer Compliance Measurement Program (TCMP) audit data that the IRS provides. However, when Klepper and Nagin looked at ambiguity reduction, the empirical study results were contrary to the results found when looking at unambiguous items. The less compliant returns were those handled by preparers. It is not clear whether this result is because the returns handled by tax preparers tend to be more complex. Alternatively, perhaps, this is due to deliberate attempts by tax preparers and taxpayers to deceive the IRS or simply aggressive tax reduction.

Slemrod and Sorum (1984) look at compliance cost. Time cost, income characteristics, demographic characteristics affect compliance cost. In particular, they find that for Minnesota residents being older, unmarried, self-employed, and less educated are positively related to preparer use. Long and Caudill (1987) find a positive relationship between marginal tax rates and preparer use. Collins, Milliron, and Toy (1990) found that while taxpayer characteristics matter but so does the taxpayer's objective. Slemrod (1989) examines the usefulness of tax preparers in uncovering legal ways to reduce tax liability. The tax rate effect is strongest among individuals who itemize.

Beck, Jung, and Davis (1996) use a game theoretic model that in the later portion of the paper is experimentally tested. In the experiment, subjects sorted into three groups based on private information. Following theory, demand for tax advice increased with the magnitude of the uncertain tax deduction. In addition, they researched the impact of advice on pre-audit tax revenue and found a link to the magnitude of the uncertain tax deduction. If the tax deduction in question is high, taxpayers with the opportunity to purchase advice report lower than average income and paid lower taxes than taxpayers without this option. Contrary to theory, a look at post-audit tax payments found that increasing the availability to purchase advice resulted in an excessive use of this service and increased reports of low income regardless of advice received.

Blumenthal and Slemrod (1992) estimate that individuals using professional preparers incurred an average cost of $132 in 1989, compared to an average expense in real terms of $98 in 1982. In addition, tax reform did not reduce the amount of complexity of the tax system or the need for professional tax assistance rates. Using TCMP data, Dubin, Graetz, Udell, and Wilde (1992) look at the demand for different types of preparers. They look at paid and non-paid preparers. They find significant differences in the factors that explain the demand for paid preparers who are and are not able to represent taxpayers before the IRS. In particular, increases in audit rates and the use of IRS penalties were major factors. Erard (1993) examines micro-level audit data from the IRS and finds that preparer use reduces many informational and computational barriers to tax compliance. However, he finds that preparer use increases non-compliance. Preparer use may also have negative effects on tax efficiency and equity.

Christian, Gupta, and Lin (1993) state that tax preparer use depends upon several factors beyond the three categories ascribed by Cuccia (1994). Some people seek advice because their time cost of return preparation is great. If individuals are unfamiliar with the forms they need to file, they may seek advice. A self-employed worker is also more likely to require a preparer. The income level or marginal tax rate also has an impact on tax preparer use. Regardless of the reason for using a tax preparer, taxpayers may be one of two types. They may be honest and simply trying to reduce uncertainty or intentionally trying to evade proper payment of their tax liability.

Ashley and Segal (1997) use 1988 Individual Public-Use Microdata File (IMT) to investigate the characteristics of taxpayers. The paper's goal is similar to Christian, Gupta, and Lin (1993). The results of a logit estimation of the reduced form model for paid tax preparer use establish that income-related dollars per schedule, as measured by the absolute positive income,[8] are significant and positively correlated to the likelihood of using a paid tax preparer when filing schedule B or E.

Results contrary to those of prior studies were observed for the significance of total positive income, marginal tax rate, measure of dependents, and schedule A. Total positive income as well as the marginal tax rate is not significant in the decision to use a tax preparer. An exemption has a negative relationship with preparer use. Schedule A also has a significant negative coefficient.

Conclusion

The tax evasion model with the tax preparer has only received preliminary treatment. This dissertation extends the theoretical and empirical reach of tax evasion by revisiting some previous research and using new techniques to explore this area.

In Chapter 2, a game theoretical model illustrates how taxpayers would report income if they had to self-prepare their returns. This is comparable to the classic tax evasion model, which does not include the tax preparer. In addition, the chapter contains a model that provides perfect tax advice as is in Beck, Jung, and Davis (1996); however, the tax agency does not have a predetermined audit policy. Thus, the first model presents a picture of how a tax agency might audit in a world where all taxpayers self-prepare and how taxpayers would report taxable income. The last model with perfect advice does the same thing but also solves for the probability of not getting advice.

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[8] The absolute positive income is a measure created by Ashley and Segal to further explain tax preparer use. It links tax preparer use to other expenses and deductions beyond total positive income.

In Chapter 3, two additional game theoretical models explore the taxpayer-tax agency result when the advice available is uncertain. Suppose the tax preparer provides faulty information or is not thoroughly knowledgeable about some ambiguous tax law. A comparison with the results in Chapter 2 provides an interesting perspective not investigated before this dissertation.

In Chapter 4, an empirical model investigates the characteristics of Form 1040 taxpayers who use a tax preparer. I extend the model to a sample of married taxpayers who file Form 1040 jointly. Christian, Gupta, and Lin (1993) and Ashley and Segal (1997) consider the Form 1040 taxpayers briefly. However, neither one looks at a sample of married filers solely. In addition, this chapter includes an aggregated audit variable, which accounts for some knowledge of tax policy. Researchers look at tax law changes in isolation. For example, after the earned income tax credit (EIC) changed in 1993 to include individuals without dependents, several individuals examined EIC compliance rates. However, in chapter 4, I discuss tax preparer use in conjunction with tax law changes. It is important to note if tax law changed, possible increases in complexity, increase preparer use. Variables are included for the alternative minimum tax, childcare credit, and the EIC.

Chapter 5 revisits the results of Christian, Gupta, and Lin (1993) and Ashley and Segal (1997). It examines the results found in their studies, which were before and after the Tax Revenue Act of 1986. The current results are for after the Revenue Reconciliation Act of 1993, which revamped several areas of the tax code.

CHAPTER 2
A THEORETICAL MODEL OF TAX PREPARER IMPACT ON TAX AUDIT AND COMPLIANCE RATES WITH PERFECT ADVICE

Introduction

Tax reporting behavior is more than a simple economic decision. According to some researchers, taxpayers identify the annual tax payment as a civic duty (Alm et al. 1992; Newberry et al. 1993). While one may find it difficult to dispute that taxpayers wish to remit lower tax payments, taxpayers also wish to avoid audits.

One could argue that this has led to an increase in tax preparer use. In 1989, 50 percent of American taxpayers used a tax preparer to complete their returns (http://www.wsj.com). In 1995, that number increased to 51 percent. By 1999, the percentage of returns completed by a preparer increased to 56 percent. In light of the concerns posed in Chapter 1 and some new laws governing the behavior of Internal Revenue Service (IRS) agents, the overall number of audits decreased significantly (while the United States budget also decreased). In 1994, the IRS audited 0.72 percent of returns. In 1998, the IRS decreased its number of audits to 0.46 percent.

Therefore, one might believe that the increase in preparer use led to the decrease in the audit rate. Yet, let us look at the reasons given for auditing returns from 1992 to 2000 as noted in Table 2-1. The IRS selects returns based on a number of criteria. In 1994, 3.4 percent of audited returns' selection reason was the preparer.[1] This increased to

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[1] The IRS compiles a list of preparers who tend to file returns with questionable tax positions.

Table 2-1 Audit Selection Reason by Year

Selection Reason	% of Audits for this Selection Reason								
	Fiscal Year								
	2000	1999	1998	1997	1996	1995	1994	1993	1992
Total	100	100	100	100	100	100	100	100	100
DIF	24.3	28.6	28.8	33.1	34.3	24.7	20.5	36.3	46.4
Related Return to One Selected	18.6	20.0	20.4	20.2	19.1	14.3	14.4	19.2	20.5
Taxpayer Request	9.0	2.8	2.2	1.7	1.6	1.4	1.6	1.3	0.9
Refusal to File Return	8.7	9.8	11.7	12.2	18.5	39.0	41.9	13.4	0.7
Studies: Info Gathering Project	8.5	9.5	12.8	9.6	6.0	4.8	5.1	5.8	5.3
Preparer of Returns	5.2	5.8	6.4	5.6	4.4	3.3	3.4	3.7	3.7
Claims for Refund	4.9	3.0	2.3	2.1	2.7	2.3	2.7	3.9	3.7
Delinquent Returns or Collection	3.3	2.5	2.6	2.5	1.8	1.9	2.7	4.9	5.4
Referrals	2.8	2.4	3.5	2.4	1.7	1.3	1.1	0.0	0.0
Information Returns or Matching	2.7	2.5	2.3	1.9	1.7	1.5	1.8	3.1	3.0
Regular Classification	2.2	2.3	2.6	3.5	3.4	2.5	2.2	3.4	4.3
Other Studies/TCMP	1.5	1.2	1.1	0.6	0.5	0.6	0.3	0.5	0.5
Fraud/Criminal/Special Enforcement	1.0	0.9	0.8	0.7	0.6	0.6	0.6	2.1	2.2
Other	0.7	0.7	0.4	0.4	0.3	0.2	0.1	0.3	0.4
Carryback Refund	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3
Self-Employment Tax	0.3	0.7	1.3	2.7	2.1	0.5	0.6	0.8	1.4
State Information	0.2	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4
Employee Returns	0.2	0.1	0.1	0.1	0.3	0.3	0.1	0.2	0.7
Minimum Tax Program	0.2	0.3	0.3	0.2	0.3	0.2	0.3	0.3	0.3

Source: The Transactional Records Access Clearinghouse at Syracuse University.

6.4 percent in 1998. The magnitude of these numbers pale in comparison to the 20.5 percent of audited returns in 1994 and 28.8 percent in 1998 that received a high score from the Discriminant Function System (DIF), which assigns a numeric score to processed returns. A high score increases the likelihood that an audit will result in a tax liability change. However, preparer targeted audits grew by about 88 percent in the 4-

year time period whereas DIF audited returns only grew by about 40 percent. The table details other types of audits conducted by the Internal Revenue Service as well.[2]

While the overall audit rate decreased, the audit rate associated with tax preparers increased more than the DIF audit rate did. Therefore, research that examines the tax preparer's role in revenue collection and compliance seems relevant. In particular, studying the relationship that exists between preparers and taxpayer reporting choices as well as tax agency audit rates is necessary.

The United States tax code is several book volumes long. Some taxpayers find it difficult to ascertain their taxable income level. Therefore, I consider the taxpayer's option to purchase advice. The IRS provides free advice to taxpayers through various community programs, but tax preparers do more to reduce tax liability. The taxpayer's opportunity to obtain professional advice receives a different treatment here than in other research. The tax agency does not pre-commit to an audit policy and the taxpayer has some information before purchasing advice. This paper thus builds on the Beck, Davis, and Jung (1996) model, where advice was certain, but taxpayers knew little ex-ante.

Beck, Davis, and Jung (1996) determine who will purchase advice and how they will report. This paper examines how the presence of tax advice changes the audit and reporting probabilities. Optimal responses by the tax agency are a part of the model because it has a role in the tax reporting process.

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[2] Two noticeable audit selection reasons are the self-employment tax and the minimum tax program. In Chapter 4, where I characterize taxpayers filing form 1040 who seek professional assistance, two variables in the model are self-employment and the alternative minimum tax.

Taxpayers want to know if taking a deduction after obtaining professional advice increases audit chances. The tax agency wants to know what audit policy it should follow to collect the maximum net revenue. Many stipulate that penalties dissuade tax evasion (Becker 1967; Allingham and Sandmo 1972). However, the tax agency pursues its goal with audit policy as its only instrument. The tax agency does not set penalties and has no control over tax rates; Congress makes these decisions.

As noted previously, the percentage of audits decreased, but the audits are now more thorough as evidenced by an increase in the additional taxes and penalties collected. In this case, the penalty structure that the government sets is crucial. Moreover, tax code changes warrant attention.[3]

The paper provides an enhanced understanding of the tax collection procedure. I develop a game theoretic model to examine the progressive role of the preparer in the tax filing decision. The taxpayer and the tax agency play a sequential game. Taxpayer consultation with a preparer to learn taxable income is an option in one version of the game in this chapter. Receipt of the return, whether taxpayer or preparer prepared, gives rise to the tax agency's audit choice.

The taxpayer's objective is to escape audit and remit a low tax payment. The taxpayer can report low or high taxable income on their return. The difference between the two taxable income levels is uncertainty about tax deduction eligibility. The tax agency wants to maximize net revenue so the government can fund public policies. The third player, the tax preparer, acts passively in the filing decision.

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[3] I report comparative static results for the audit probability with respect to changes in the tax rates and the penalty, but I do not solve for the optimal tax rates or penalties. Since the tax agency does not set tax rates or penalties, determining optimal rates would not have meaning because the agency could not change them.

I solve for the taxpayer's equilibrium probability of reporting low taxable income. I also solve the tax agency's equilibrium probability of auditing those reporting low taxable income. The results depend on beliefs held by each player and whether preparer assistance was obtained. The model I develop is similar to that of Beck, Jung, and Davis (1996) except there are multiple consumer types who have some private information before buying advice. This allows the tax agency to make a decision based on individual characteristics of each return received, which allows me to solve for the equilibrium audit policy. Another inclusion, which I describe later, is an audit "hassle" cost.

Previous Studies

Allingham and Sandmo (1972) provide a framework for various extensions of a tax evasion. Other researchers later integrated labor supply and the repeated nature of the reporting decision into the tax evasion model.[4] Since Allingham and Sandmo, richer tax and penalty structures have been added to the model of tax evasion.[5] The growth of information economics, imperfect information over policy parameters such as audit rates and true tax liability, has also found a place in tax evasion.[6] In addition, some researchers extend the number of items a taxpayer must report.[7] Many account for the roles of morals and social dynamics.[8] The last area is the inclusion of the tax preparer.

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[4] See Weiss (1976), Pencavel (1979), Cowell (1981), Sandmo (1981), and Pestieau and Possen (1991) for labor supply. See Engel and Hines (1994) regarding the repeated nature of the tax reporting decision.

[5] See Graetz, Reinganum, and Wilde (1986), Reinganum and Wilde (1985), Border and Sobel (1987), Mookherjee and P'ng (1989), Beck, Davis, and Jung (1991), Sanchez and Sobel (1993), Sansing (1993), Cronshaw and Alm (1995).

[6] See Greenberg (1984), Reinganum and Wilde (1986a), Cremer, Marchand, and Pestieau (1990), Erard and Feinstein (1994a).

[7] See Klepper and Nagin (1989), Martinez-Vazquez and Rider (1995), Rhodes (1995), Rhodes (1999).

[8] See Usher (1986) and Slemrod and Yitzhaki (1987).

Thus, studies of tax evasion have changed significantly since the Allingham and Sandmo paper. The literature review in Chapter 1 discussed the papers that include the tax preparer. The model in this chapter could fall into either Cuccia's (1994) category of uncertainty reduction regarding unambiguous income or his category of ambiguity reduction or exploitation.

In the model developed by Beck, Davis, and Jung (1996), the taxpayer can seek advice from a preparer who has knowledge of the tax-reporting arena. This model seeks to enhance the area of uncertainty reduction. It states that tax advice can serve as a signal that the tax agency may use to alter their auditing behavior. These policies in return affect the reporting behavior of taxpayers.

Model and Assumptions

As in Beck and Jung (tax agency play a sequential game where the taxpayer reports income and the tax 1989b), Beck, Davis, and Jung (1992), and Reinganum and Wilde (1991), the taxpayer and the agency decides whether an audit is an appropriate action. The taxpayer maximizes expected utility, which is a function of total income, tax liability, and penalties. The tax collection agency decides whether to audit when it receives the return. The agency does not pre-commit to an audit strategy. In addition, the tax collection agency maximizes expected net revenue and expected penalties. The government sets tax rates and penalties, and the tax agency, which collects revenue for the government, takes tax rates and penalties as given. Therefore, I will not solve for optimal tax rates or penalties.

I look at two versions of the model. In the first version, each taxpayer self-prepares her tax returns. In the second version, a tax preparer resolves all taxpayer uncertainty if the taxpayer obtains advice. The game is one of incomplete information because the tax agency does not know player types. In addition, some taxpayers do not know their taxable income, but they can learn by purchasing advice.

The Game Tree with Self-Preparation by All Taxpayers

Some fraction δ of the population knows their tax liability payment with probability one.[9] I refer to this type as certain (C). They have either high taxable income with certainty, labeled H or low taxable income with certainty, labeled L. The low taxable income taxpayers compose a fraction β of the certain population and the remaining $1 - \beta$ has high taxable income. The other fraction $1 - \delta$ of taxpayers is uncertain (U) about their taxable income level. These taxpayers also either have high taxable income (UH) or low taxable income (UL). A fraction α of the uncertain taxpayers has high taxable income and the other $1 - \alpha$ have low taxable income. Thus, there are four types of taxpayers.

The tax audit game will incorporate mixed strategies in the equilibrium of my interest, so it is useful to introduce the probabilities of playing some of the pure strategies at this point. As stated earlier, some taxpayer types do not know their taxable income level. The L types report low taxable income with probability 1. The H types know with certainty that they have high taxable income, but they report low taxable income with probability ω^c. The U types decide whether to report low taxable income and face the possibility of an audit. For these taxpayers, the probability of reporting low taxable income and self-preparing is ω^u.

I construct the players' payoffs under the following assumptions. Let me assume that all taxpayers have the same income, Y. There are two taxable income levels. A taxpayer has either y_1, low taxable income, or y_2, high taxable income, where $y_1 < y_2$. Each taxpayer has the choice of reporting low or high taxable income, respectively. The difference between having low taxable income and high taxable income is the ability to take a deduction.

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[9] See the end of the chapter for the game tree labeled "All Taxpayers Self-Prepare."

As an example, some people have home offices and others do not. The ones with a home office receive a deduction. Some individuals know the requirements for such a deduction. Others do not know the law or have circumstances not explicitly covered in the law.

Also, assume that the tax liability, the payment to the tax agency, for having taxable income y_i equals t_i, $i = 1,2$. The penalty is a function of true tax liability and reported tax liability, $q = f(T)$, where $t_2 > t_1$ and $T = t_2 - t_1$. Individuals who report low tax liability may have a penalty imposed if audited. Thus, q will represent penalties paid by the taxpayer to the tax agency.

Assume that that the taxpayer may incur h, the hassle or worry cost of an audit. It is the dollar value of the inconvenience of an audit and is a loss for taxpayers regardless of the outcome. Taxpayers, even if they correctly report income, do not recoup the hassle cost once the tax agency initiates an audit.

The tax agency has cost, c, for auditing taxpayers. The tax agency audits because there is the possibility of error. The expected revenue and the penalty that the tax agency receives from taxpayers that underreport tax liability must be greater than the cost of auditing, $c < T + q$. Otherwise, auditing would not be a beneficial activity.[10]

With regard to the tax agency, only individuals who report low taxable income risk an audit. The tax agency audits taxpayers reporting low taxable income with probability p_n. Taxpayers reporting high taxable income avoid an audit because they are paying the highest amount of tax possible.

Uncertain taxpayer types do not know if they have low or high taxable income. The one decision that they must make is whether to report low taxable income or high taxable income. The certain taxpayers face the same decision, but with better information. The tax agency can audit or not audit taxpayers that report low taxable income. The game has the information sets of taxpayers who report low taxable income connected because the tax agency does not know taxpayer types before receiving the tax return or performing an audit.

Equilibrium Strategy Conditions

The following restrictions on parameters ensure that the equilibrium in the game is the most reasonable one. The expected gain of filing low taxable income is T times the probability of having low taxable income while the cost is the hassle cost paid everyone the tax agency audits plus the expected penalty paid by those who the audit reveals as having high taxable income. Thus, the expected audit cost to an uncertain taxpayer must be greater than the expected tax savings from reporting low taxable income, or all uncertain taxpayers would file as having low taxable income even if the tax agency audited all such returns. This implies that:

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[10] For simplicity, I will focus on what the Internal Revenue Service calls face-to-face audits. A face-to-face audit occurs when the Internal Revenue Service sends a revenue agent to your home or attorney to review your tax records. They also perform service center audits. The staff at the service center sends a notice that they are reviewing or auditing your tax records. If the taxpayer has committed tax evasion, she receives a notice from the service center indicating improper treatment of income. In addition, the IRS informs the taxpayer of any payments that she needs to make. Face-to-face audits are costly, in terms or personnel and time, while correspondence audits are not as cost intensive.

(1) $\alpha q + h > (1-\alpha)T$.

The tax agency also calculates its expected audit cost. Previously, I assumed that $c < T + q$. According to the following, a more strict condition, the audit cost must lie below the expected revenue that the tax agency receives after a successful audit even if all taxpayers file as having low taxable income. The expected revenue depends on the proportion of taxpayers not eligible for the deduction and the fraction of taxpayers who are uncertain. Thus, the following must hold for a mixed strategy equilibrium:

(2) $c < [\delta\beta + \alpha(1-\delta)](T+q)$.

Note, if the certain and uncertain taxpayers have the same distribution of taxpayers, $\alpha = \beta$, then c must be below that function times $T + q$.

Probability of Audit

The tax agency collects tax revenue for the government. While the government may seek to maximize social welfare, the tax agency maximizes revenue. Thus, the agency cares if taxpayers reporting low taxable income actually have high taxable income.

If the taxpayer reports low taxable income (whether she should pay high tax liability or low tax liability) and is not audited by the tax agency, the tax agency receives the low tax payment, t_l. The scenario is different if the tax agency chooses to audit an individual who reports low taxable income. If an audit confirms that a taxpayer should pay low tax liability, the tax agency receives the low tax payment less the audit cost, t_l –

c. However, if a taxpayer has high taxable income and is audited by the tax agency, the tax agency receives the high tax payment and the penalty less the audit cost, $t_2 + q - c$.

Whether the agency audits depends upon whether its expected revenue from auditing, $EV^A(AU)$, is greater, equal, or less than its expected revenue if it does not audit, $EV^A(NAU)$. This can be written as:

(3) $\quad p_n = 0 \qquad$ if $EV^A(NAU) > EV^A(AU)$,

(4) $\quad p_n = [0,1] \qquad$ if $EV^A(NAU) = EV^A(AU)$, and

(5) $\quad p_n = 1 \qquad$ if $EV^A(NAU) < EV^A(AU)$.

Conditions (3) and (5) define pure strategies. When $p_n = 0$, the tax agency does not audit because the expected value of not auditing is greater than the expected value of auditing. When $p_n = 1$, the tax agency audits all taxpayers who report low taxable income because the expected value of auditing is greater than the expected value of not auditing. Condition (4) is required for the tax agency to play a mixed strategy. The tax agency randomly audits taxpayers who report low taxable income. Mixed strategy equilibria allow for random audits, which are equilibrium actions without tax agency commitment.

Since the expected revenues $EV^A(AU)$ and $EV^A(NAU)$ depend on the taxpayer's strategies ω^c and ω^u, conditions (3) to (5) are really specifying the agency's best reply correspondence. Based on the taxpayer types and payments, the expected value from not auditing taxpayers who report low taxable income is:

(6) $\quad EV^A(NAU) = \delta\beta\omega^c t_1 + \delta(1-\beta)t_1 + (1-\delta)\alpha\omega^u t_1 + (1-\delta)(1-\alpha)\omega^u t_1$.

Based on taxpayer types and payments, the expected value from auditing taxpayers who report low taxable income is:

$$(7)\qquad EV^{A}(AU) = \delta\beta\omega^{c}(t_2 + q - c) + \delta(1-\beta)(t_1 - c)$$
$$+ (1-\delta)(\alpha)(\omega^{u})(t_2 + q - c) + (1-\delta)(1-\alpha)(\omega^{u})(t_1 - c).$$

Substituting and rearranging terms, the agency's best reply correspondence can be written as:

$$(8)\qquad p_n = \begin{matrix} 0 \\ [0,1] \\ 1 \end{matrix} \text{ if}\left[\delta\beta\omega^{c} + \delta(1-\beta) + (1-\delta)\omega^{u}\right]c \begin{matrix} > \\ = \\ < \end{matrix} \left[\delta\beta\omega^{c} + (1-\delta)\alpha\omega^{u}\right](T + q),$$

where $p_n = [0,1]$ means the agency is indifferent between any audit rate between 0 and 1.

Probabilities of Reporting Low Taxable Income

The reporting probabilities involve finding the expected value of reporting low taxable income and expected value of reporting high taxable income. The tax agency will not audit individuals who report high taxable income because it receives the highest level of tax revenue from these taxpayers. It would be costly for the tax agency to audit high taxable income individuals, and there is no additional benefit from performing the exercise. With a finite number of taxpayer types, some taxpayers are paying the greatest possible tax. Imposing audit risk on them would just increase the rate of underreporting.

Two taxpayer types do not incur a penalty. The taxpayer that pays high tax liability does not incur a penalty because she is paying the highest tax possible, and thus, the tax agency will not audit. Her expected after-tax income is $Y - t_2$. If an individual has low taxable income and escapes audit, she also does not incur a penalty. Therefore, she has an expected after-tax income of $Y - t_1$.

Suppose the tax agency audits taxpayers reporting low taxable income with probability p_n. The audit reveals the taxpayer's tax liability. Some individuals reporting low taxable income have high taxable income and have income of $Y - t_2 - q - h$ after an audit. Other taxpayers who reported low taxable income do have low taxable income. Thus, they paid the correct tax liability so they only pay the hassle cost for enduring an audit. Their income after an audit is $Y - t_1 - h$.

I still need to find two reporting probabilities. Some H type taxpayers report low tax liability with probability ω^c. The best reply correspondence for the taxpayers who have high taxable income with certainty is:

(9) $\omega^c = 0$ if $EV^P(RL) < EV^P(RH)$,

(10) $\omega^c = [0,1]$ if $EV^P(RL) = EV^P(RH)$, and

(11) $\omega^c = 1$ if $EV^P(RL) > EV^P(RH)$.

Condition (9) and condition (11) specify pure strategies. Condition (9) states that certain high type taxpayer does not report low taxable income if the expected value of reporting high taxable income is greater than the expected value of reporting low taxable income. Condition (11) states that certain high type taxpayer will report low taxable income if the expected value of reporting low taxable income is greater than the expected value of reporting high taxable income. Condition (10) defines a mixed strategy where the certain high type taxpayer randomly reports low taxable income.

Taking audit probabilities as given, the expected value of reporting low taxable income for the H types is:

(12) $EV^P(RL) = p_n(Y - t_2 - q - h) + (1 - p_n)(Y - t_1)$.

The expected value of reporting low taxable income is rather simple because as stated earlier the high taxable income taxpayers do not face an audit. It is:

(13) $EV^P(RH) = Y - t_2$.

Therefore, the certain high type taxpayer best reply correspondence can be written as:

$$\omega^c = \begin{matrix} 0 \\ [0,1] \\ 1 \end{matrix} \text{ if} (1-p_n)T \begin{matrix} < \\ = \\ > \end{matrix} p_n(q+h), \tag{14}$$

where $\omega^c = [0,1]$ means that the certain taxpayer is indifferent between reporting low taxable income and high taxable income.

Uncertain taxpayers report low taxable income with probability ω^u. The fraction α of uncertain taxpayers has high taxable income. Some fraction *(1 - α)* has low taxable income. The best reply correspondence for the uncertain type taxpayers is:

$$\omega^u = 0 \qquad \text{if } EV^P(RL) < EV^P(RH), \tag{15}$$

$$\omega^u = [0,1] \qquad \text{if } EV^P(RL) = EV^P(RH), \text{ and} \tag{16}$$

$$\omega^u = 1 \qquad \text{if } EV^P(RL) > EV^P(RH). \tag{17}$$

Conditions (15) and (17) are pure strategies. If the expected value of reporting high taxable income is greater than the expected value of reporting high taxable income, the uncertain taxpayer will not report low taxable income, as in condition (15). If the expected value of reporting low taxable income is greater than the expected value of reporting high taxable income, the uncertain taxpayer will report low taxable income. Condition (16) defines a mixed strategy where the uncertain taxpayer reports low taxable income randomly.

The expected value of reporting low taxable income for the uncertain taxpayers is:

$$\begin{aligned} EV^P(RL) = {} & \alpha[p_n(Y - t_2 - q - h) + (1-p_n)(Y - t_1)] \\ & + (1-\alpha)[(1-p_n)(Y - t_1) + p_n(Y - t_1 - h)]. \end{aligned} \tag{18}$$

The expected value of reporting high taxable income for the uncertain taxpayers is:

(19) $EV^{P}(RH) = \alpha(Y - t_2) + (1-\alpha)(Y - t_2)$.

Therefore, the uncertain type taxpayer best reply correspondence can be written as:

(20) $$\omega^{u} = \begin{matrix} 0 \\ [0,1] \\ 1 \end{matrix} \text{ if} (1-\alpha p_n)T \begin{matrix} < \\ = \\ > \end{matrix} p_n(\alpha q + h),$$

where $\omega^{u} = [0,1]$ means that the uncertain taxpayer is indifferent between reporting low taxable income and high taxable income.

Equilibrium Strategies for the Game with Self-Preparation by All Taxpayers

Theorem 1: The game when all taxpayers self-prepare has an equilibrium which is in mixed strategies exists when parameter restriction (1) and (2) hold.

Proof of Theorem 1: First, note that $p_n = 0$. Then, from condition (14) and (20) $\omega^{c} = 1$ and $\omega^{u} = 1$. Substituting these values, condition (8) reduces to $c \begin{matrix} > \\ = \\ < \end{matrix} [\delta\beta + \alpha(1-\delta)](T+q)$. Condition (2) implies that $c < [\delta\beta + \alpha(1-\delta)](T+q)$ so that $p_n = 1$, a contradiction.

If $p_n = 1$, then from condition (14) and (20) $\omega^{c} = 0$ and $\omega^{u} = 0$ which from condition (8) implies $p_n = 0$, a contradiction. Hence, in equilibrium, $p_n = [0,1]$.

Now consider ω^{c} and ω^{u} as argued above, $\omega^{c} = \omega^{u} = 0$ and $\omega^{c} = \omega^{u} = 1$ are inconsistent with $p_n = [0,1]$. Now note that $\dfrac{T}{\alpha(T+q)+h} > \dfrac{T}{T+q+h}$. This rules out $\omega^{c} = 1$ and $\omega^{u} = 0$ and $\omega^{c} = \omega^{u} = [0,1]$. Hence, in (14) and (20), the only cases possible are:

(a) $\omega^{c} = 0$ and $\omega^{u} = 1$,

(b) $\omega^{c} = [0,1]$ and $\omega^{u} = 1$, or

(c) $\omega^c = 0$ and $\omega^u = [0,1]$.

Case (a) is consistent with $p_n = [0,1]$ in (8) only if $[\delta(1-\beta)+\alpha(1-\delta)]c = (1-\delta)(T+q)$. While possible, this will not hold generically, so is ruled out.

Case (b) implies that the certain high taxable income taxpayers will employ a mixed strategy in reporting low taxable income and the uncertain taxpayers will only report low taxable income. Though consistent with $p_n = [0,1]$, it is necessary that $\beta < 1/\delta$. This is not a desirable condition for an equilibrium because it limits the applicability of the equilibrium to a specific population distribution.

Therefore, case (c) which implies that the certain high taxable income taxpayers will only report high taxable income and the uncertain taxpayers will randomize over reporting low or high taxable income. This case requires that parameter restrictions (1) and (2) hold. QED

Proposition 1: Under the conditions given in Theorem 1, the equilibrium of the game when all taxpayers self-prepare has the following strategies:

(1) taxpayers who are certain they have high taxable income do not report low taxable income with probability zero, $\omega^c = 0$,

(2) taxpayers who are certain they have low taxable income report low taxable income,

(3) taxpayers who are uncertain about their taxable income report low taxable income with probability $\omega^u = \frac{\delta(1-\beta)c}{(1-\delta)[\alpha(T+q)-c]}$,

(4) the tax agency audits returns reporting low taxable income with probability

$p_n = \frac{T}{(\alpha)(T+q)+h}$, and

(5) the tax agency does not audit returns reporting high taxable income.

Proof of Proposition 1: The proof for this proposition follows directly from Theorem 1 above. Let me present some additional intuition for the solution here. The probability that an H type taxpayer will report low taxable income is ω^c. If the H type taxpayer randomly reports low tax liability, the audit probability is equal to the following fraction, $p_n = \frac{T}{T+q+h}$, according to condition (14). The probability that a U type taxpayer will report low taxable income is ω^u. If the U type taxpayers randomly report low taxable income, the audit probability is equal to the following fraction, $p_n = \frac{T}{(\alpha)(T+q)+h}$, according to condition (20). As long as $\alpha < 1$, I find that

$$\frac{T}{\alpha(T+q)+h} > \frac{T}{T+q+h}.$$

Using condition (1) and condition (2), this satisfies the equilibrium where $\omega^c = 0$ and $\omega^u = [0,1]$. The taxpayers who are certain they have high taxable income never report low taxable income and taxpayers who are certain they have low taxable income always report low taxable income. The uncertain taxpayers play a mixed strategy. These taxpayers chose to not report high to avoid a penalty from underreporting tax liability. These taxpayers also resist the urge to always report low. The tax agency uses a mixed strategy when auditing the low taxable income taxpayers. It never audits taxpayers who report high taxable income. QED

Comparative Static Results for the Game with Self-Preparation by All Taxpayers

I can assess the impact of tax law changes on the audit probability. [11] At times, legislators change the tax burden associated with different types of taxpayers. As the low tax liability increases, the probability of audit decreases. Taxpayers who are eligible for the tax deduction will find that the deduction is smaller. Taxpayers who are not eligible for the tax deduction will find that paying low tax liability is less attractive as the low tax liability approaches the high tax liability. The tax agency responds by decreasing the number of audits.

Suppose the legislators increase the tax burden of high taxable income individuals. As the high tax liability increases, the probability of audit increases. This creates a larger gap between the low tax liability and the high tax liability. The tax agency feels that it may discover more taxpayers evading taxes because taxpayers who have high taxable income may have a strong incentive to report low taxable income.

The two previous derivatives show the relationship that exists between tax liability and the audit probability. It seems appropriate to investigate the impact of increasing the tax savings on the audit probability. Following from the two previous results, as the tax savings increases, the audit probability increases.

As the low tax liability increases, the probability that a taxpayer reports low taxable income given she is uncertain increases. If the government increases the low tax liability by decreasing the deduction amount, the taxpayer is more likely to report low taxable income. As low tax liability approaches the high tax liability, the taxpayer is more comfortable reporting low tax liability. One line of reasoning is that the tax agency is less likely to detect any cheating as the low and high tax liabilities approach one another. Another possibility is that the tax agency will not notice whether taxpayers are eligible for the tax deduction. Holding constant audit cost, the marginal gains by the tax agency of auditing certain low tax liability returns may be minimal or negative.

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[11] Appendix A completely evaluates the comparative static results for each probability derived in Chapters 2 and 3.

As the high tax liability increases, the probability that a taxpayer reports low taxable income given she is uncertain decreases. Even though the taxpayer is uncertain about their tax liability, they error on the side of paying high tax liability rather than take the chance and report low tax liability. They understand that if they mistakenly report low tax liability and indeed are high tax liability that they will have to pay the correct tax liability. They also pay a penalty and the hassle cost.

As the tax savings grows larger, the probability that a taxpayer will report low tax liability decreases. Taxpayers are aware that when the high tax liability increases or the low tax liability decreases that the tax agency is looking for taxpayers who try to reduce their tax liability by reporting incorrectly. Taxpayers want to pay the lowest possible tax liability. However, they do not want to spark an audit by the tax agency. Even taxpayers, who are low tax liability, may want to report high tax liability to avoid an audit.

The Game Tree with Perfect Advice

I now introduce the possibility that uncertain taxpayers may obtain professional advice at a cost.[12] The population is the same as in the previous game. The certain taxpayers, C, comprise the fraction δ of the population. The low taxable income taxpayers, L, comprise the fraction β of the certain population and the remaining $1 - \beta$

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[12] See the game tree at the end of the chapter labeled "Perfect Advice."

has high taxable income, H. The other fraction $1 - \delta$ of taxpayers is uncertain, U, about their taxable income. Some fraction α of the uncertain taxpayers has high taxable income, UH, and the other $1 - \alpha$ has low taxable income, UL.

As above, the equilibria of interest involve mixed strategies on the part of some players. The uncertain taxpayer types make a decision about tax advice. If a taxpayer is certain about their taxable income, she does not need to purchase advice. I connect the information sets of uncertain taxpayers because they do not know their type. With probability π, uncertain taxpayers do not purchase advice. With probability $1-\pi$, uncertain taxpayers purchase advice. The uncertain taxpayers who purchase advice receive a signal, a completed tax return, from the tax preparer. The advice purchase reveals whether the taxpayer has high taxable income or low taxable income.

The uncertain taxpayer who gets advice expends some amount f. It is customary for the individual or company that prepared the return to represent and/or aid the taxpayer during the audit process. In many cases, the fee for representation increases with the length of time it takes to complete the audit. It would be acceptable to make f a function of time, but for simplicity, f will remain a flat fee for the tax return preparation.

Whether a taxpayer does or does not obtain advice, she must report her taxable income. The taxpayers who are certain that they have low taxable income report low taxable income with probability 1. The taxpayers who are certain they have high taxable income report low taxable income with probability $\overline{\omega^c}$.

Again, I connect the information sets of the uncertain taxpayers because they do not know their type. The taxpayers who do not purchase advice and remain uncertain report low taxable income with probability $\overline{\omega^u}$. The uncertain taxpayers who purchase advice follow the advice with probability 1. Thus, if the preparer tells the taxpayer to report high taxable income, she reports high taxable income.[13] There is an asymmetry between those who know they have high taxable income and those who a preparer tells that they have high taxable income by a preparer. The former can lie, the latter cannot because the preparer would not allow them to do so.

As in the previous game where all taxpayers self-prepare, taxpayers who self-prepare pay h if audited. The penalty, q, continues to be a function of T.[14] In addition, the tax agency pays a cost, c, to audit uncertain taxpayers who do not get advice.

The tax agency does not audit the taxpayers who receive advice because it knows that the return is error free. The tax agency audits all other taxpayers with probability, $\overline{p_n}$. I connect the information sets for taxpayers who report low taxable income. This means that the tax agency cannot observe the decision to purchase advice. It offers me the opportunity to show what happens to the audit probability when advice is available versus when all taxpayers self-prepare.

Given the above information, I construct each player's expected payoff. The terminal nodes show payoffs, expected after-tax income for the taxpayer and expected revenue for the tax agency. For a taxpayer who reports low taxable income, the expected after-tax income is $Y - t_2$. For a taxpayer who reports low taxable income, there are four possible outcomes. If the IRS does not audit, her after tax income is $Y - t_1$. If the IRS audits and she has low taxable income, her after-tax income is $Y - t_1 - h$. If the taxpayer purchases advice, her after-tax income is $Y - t_1 - f$. Taxpayers who are high taxable income expect an after-tax income of $Y - t_2 - q - h$.

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[13] In reality, tax preparers are also subject to penalties. I do not model preparer penalties in this paper. However, according to Chapter 1, a preparer would not willfully assist a taxpayer in incorrectly reporting her taxable income. In addition, though it is difficult to determine if a taxpayer knowingly engaged in tax evasion, the IRS can jail taxpayers for gross negligence surrounding a tax position. Therefore, in the game where the tax preparer removes all uncertainty about taxable income, it seems reasonable that taxpayers will follow the advice they receive.

[14] In reality, the total amount of penalties may differ between self-preparation and professional preparation states because the tax preparer is also subject to penalties. However, I only address penalties incurred by the taxpayer.

The tax agency also has expected payoffs. Again, there are four possible payoffs. The tax agency may receive t_1 or t_2 if it does not audit. If the IRS performs an audit and the taxpayer has low taxable income, the tax agency receives $t_1 - c$. However, if the audit reveals that the taxpayer is high taxable income, the tax agency reaps more revenue. It will receive $t_2 - q - c$.

I continue to observe four taxpayer types: UH, UL, H, and L. The uncertain taxpayer has the option of seeking advice. After the taxpayer makes a reporting decision, the tax agency decides whether it will audit or not audit the taxpayer. The taxpayer that reports high taxable income, regardless of whether she seeks advice or not, is not audited by the tax agency. As stated earlier, the taxpayers who report low taxable income without having purchased advice risk an audit by the tax agency.

Equilibrium Strategy Conditions

Conditions (1) and (2) still hold in this game. In addition, tax preparers charge f for their services. This fee must be less than the tax savings times the number of taxpayers who have low taxable income. Note that taxpayers will not pay astronomical amounts to eliminate uncertainty. There is an upper bound, which is less than the taxpayer's expected tax savings found in condition (1). Tax advice is not free but not excessively priced. Thus, some taxpayers will benefit from purchasing advice. The following condition shows this:

$$(21) \qquad f < (1-\alpha)T .$$

Probability of Audit

The tax agency continues to revenue maximize using its only instrument, audit policy. Whether the agency audits depends upon whether its expected revenue if it audits is greater than, equal to, or less than its expected revenue if it does not audit. This can be written as the best reply correspondence, which is identical to the one presented when all taxpayers self-prepared, but the expected value of not auditing taxpayers and the expected value of auditing taxpayers who report low taxable income changes. The main difference here is that I must account for the advice component of the game. The expected revenues, $EV^A\left(\overline{AU}\right)$ and $EV^A\left(\overline{NAU}\right)$, depend on the taxpayers strategies, ω^c, ω^u, and π. Thus, the expected value of not auditing taxpayers reporting low taxable income who did not get advice is:

$$(22) \qquad EV^A\left(\overline{NAU}\right) = \delta\beta\overline{\omega^c}t_1 + \delta(1-\beta)t_1 + (1-\delta)\alpha\pi\overline{\omega^u}t_1 + (1-\delta)(1-\alpha)\pi\overline{\omega^u}t_1 .$$

The expected value of auditing taxpayers reporting low taxable income who did not get advice is:

$$\begin{aligned}(23) \quad EV^A\left(\overline{AU}\right) = {} & \delta\beta\overline{\omega^c}(t_2 + q - c) + \delta(1-\beta)(t_1 - c) \\ & + (1-\delta)(\alpha)(\pi)\left(\overline{\omega^u}\right)(t_2 + q - c) + (1-\delta)(1-\alpha)(\pi)\left(\overline{\omega^u}\right)(t_1 - c).\end{aligned}$$

Substituting and rearranging terms, the agency's best reply correspondence can be written as:

$$(24) \qquad \overline{p_n} = \begin{matrix} 0 \\ {[0,1]} \\ 1 \end{matrix} \text{ if } \left[\delta\beta\overline{\omega^c} + \delta(1-\beta) + (1-\delta)(\pi)\overline{\omega^u}\right]c \begin{matrix} > \\ = \\ < \end{matrix} \left[\delta\beta\overline{\omega^c} + (1-\delta)\alpha\pi\overline{\omega^u}\right](T + q),$$

where $\overline{p_n} = [0,1]$ means that the tax agency is indifferent between any audit rate between 0 and 1.

Probabilities of Reporting Low Taxable Income

The reporting probabilities are the same as the as the previous game. A taxpayer takes audit rates as given, and the best reply correspondences do not change. Substituting and rearranging terms, the certain high taxable income taxpayer's best reply correspondence can be written as:

$$(25) \quad \overline{\omega^c} = \begin{matrix} 0 \\ [0,1] \\ 1 \end{matrix} \text{ if} \left(1 - \overline{p_n}\right) T \begin{matrix} < \\ = \\ > \end{matrix} \overline{p_n}(q + h).$$

where $\overline{\omega^c} = [0,1]$ means that the taxpayer is indifferent between reporting low taxable income or high taxable income. Substituting and rearranging terms, the uncertain taxpayer's best reply correspondence can be written as:

$$(26) \quad \overline{\omega^u} = \begin{matrix} 0 \\ [0,1] \\ 1 \end{matrix} \text{ if} \left(1 - \alpha \overline{p_n}\right) T \begin{matrix} < \\ = \\ > \end{matrix} \overline{p_n}(\alpha q + h),$$

where $\overline{\omega^u} = [0,1]$ means that the taxpayer is indifferent between reporting low taxable income and high taxable income.

Probability of Not Purchasing Advice

Since obtaining advice is a choice, there is some probability π that a taxpayer will not purchase advice for the fee *f*. The best reply correspondence for uncertain taxpayers, over whether they will or will not get advice, is:

$$(27) \quad \pi = 0 \qquad \text{if } EV^P(AD) > EV^P(NAD),$$

$$(28) \quad \pi = [0,1] \qquad \text{if } EV^P(AD) = EV^P(NAD), \text{ and}$$

$$(29) \qquad \pi = 1 \qquad\qquad \text{if } EV^{P}(AD) < EV^{P}(NAD).$$

Conditions (27) and (29) define pure strategies. Condition (27) states that the uncertain taxpayer will purchase advice if the expected value of purchasing advice is greater than the expected value of not purchasing advice. Condition (29) states that the uncertain taxpayer will not purchase advice if the expected value of not purchasing advice is greater than the expected value of purchasing advice. Condition (28) specifies a mixed strategy where the taxpayer randomly purchases advice. The expected value of purchasing advice is equal to the expected value of not purchasing advice.

I connect the information sets for uncertain taxpayers at the advice node indicating that they are not sure where they are in the game. Some fraction α of these taxpayers has high taxable income. The other *1* - α of taxpayers has low taxable income. The expected value of obtaining advice is:

$$(30) \qquad EV^{P}(AD) = \alpha(Y - t_2 - f) + (1-\alpha)(Y - t_1 - f).$$

If a taxpayer does not obtain advice, she risks as audit. Therefore, the audit probability enters into this expected value. Thus, the expected value of not obtaining advice is:

$$(31) \qquad EV^{P}(NAD) = \alpha\left[\overline{p_n}(Y - t_2 - q - h) + \left(1 - \overline{p_n}\right)(Y - t_1)\right]$$
$$+ (1-\alpha)\left[\left(1 - \overline{p_n}\right)(Y - t_1) + \overline{p_n}(Y - t_1 - h)\right].$$

Substituting and rearranging terms, the uncertain taxpayer's best reply correspondence can be written as:

$$(32) \qquad \pi = \begin{matrix} 0 \\ [0,1] \\ 1 \end{matrix} \text{if } \overline{p_n}(\alpha q + h) \begin{matrix} > \\ = \\ < \end{matrix} \left(1 - \overline{p_n}\right)(\alpha T) + f,$$

where $\pi = [0,1]$ means that the taxpayer is indifferent between purchasing and not purchasing perfect advice.

Equilibrium Strategies for the Game with Perfect Advice

Theorem 2: The game when perfect advice is available for uncertain taxpayers has an equilibrium, which is in mixed strategies, that exists when parameter restriction (1) and (2) hold.

Proof of Theorem 2: Suppose the tax agency uses a pure strategy. First, note that it does not audit taxpayers reporting low taxable income and do not purchase advice, $\overline{p_n} = 0$. Then, from conditions (25), (26), and (32), the certain high taxable income taxpayers and the uncertain taxpayers report low taxable income with probability 1, $\overline{\omega^c} = 1$ and $\overline{\omega^u} = 1$. In addition, the uncertain taxpayers do not purchase advice with probability 1, $\pi = 1$.

Substituting these values, condition (24) reduces to $\overline{p_n} = \begin{matrix} 0 \\ [0,1] \\ 1 \end{matrix}$ if

$c \begin{matrix} > \\ = \\ < \end{matrix} [\delta\beta + \alpha(1-\delta)](T+q)$. Condition (2) implies that $c < [\delta\beta + \alpha(1-\delta)](T+q)$ which implies $\overline{p_n} = 1$, a contradiction.

Further, suppose the tax agency decides to audit all taxpayers who do not get advice and report low taxable income, $\overline{p_n} = 1$. Then, from conditions (25), (26), and (32), the certain high taxable income taxpayers and the uncertain taxpayers report low taxable income with probability 0, $\overline{\omega^c} = 0$ and $\overline{\omega^u} = 0$. In addition, the uncertain taxpayers do not purchase advice with probability 0, $\pi = 0$. Condition (24) implies that $\overline{p_n} = 0$, a contradiction.

Therefore, in equilibrium, the tax agency uses a mixed strategy, $\overline{p_n} = [0,1]$. Now consider, $\overline{\omega^c}$, $\overline{\omega^u}$, and π as argued above, $\overline{\omega^c} = \overline{\omega^u} = \pi = 0$ and $\overline{\omega^c} = \overline{\omega^u} = \pi = 1$ are inconsistent with $\overline{p_n} = [0,1]$. Now note that

$\frac{T}{T+q+h} < \frac{\alpha T + f}{(\alpha)(T+q)+h} < \frac{T}{\alpha(T+q)+h}$. This for example rules out the following cases:

(a) $\overline{\omega^c} = 1$ and $\overline{\omega^u} = \pi = 0$,

(b) $\overline{\omega^c} = 0$ and $\overline{\omega^u} = \pi = 1$,

(c) $\overline{\omega^c} = 1$, $\overline{\omega^u} = [0,1]$, $\pi = 0$,

(d) $\overline{\omega^c} = 1$, $\overline{\omega^u} = [0,1]$, $\pi = 1$,

(e) $\overline{\omega^c} = [0,1]$, $\overline{\omega^u} = 1$, $\pi = 0$,

(f) $\overline{\omega^c} = [0,1]$, $\overline{\omega^u} = 0$, $\pi = 1$,

(g) $\overline{\omega^c} = [0,1]$ and $\overline{\omega^u} = \pi = 0$,

(h) $\overline{\omega^c} = \overline{\omega^u} = [0,1]$ and $\pi = 1$,

(i) $\overline{\omega^c} = \overline{\omega^u} = [0,1]$ and $\pi = 0$, and

(j) $\overline{\omega^c} = \overline{\omega^u} = \pi = [0,1]$.

Hence, in conditions (25), (26), and (32), the only conditions possible are:

(a) $\overline{\omega^c} = [0,1]$ and $\overline{\omega^u} = \pi = 1$,

(b) $\overline{\omega^c} = 0$, $\overline{\omega^u} = [0,1]$, $\pi = 1$, or

(c) $\overline{\omega^c} = 0$, $\overline{\omega^u} = 1$, $\pi = [0,1]$.

Case (a) and case (b) are consistent with $p_n = [0,1]$. However, case (a) requires that $\beta < 1/\delta$. This is not a desirable condition for an equilibrium because it limits the applicability of the equilibrium to a specific population distribution. Case (b) needs the same conditions as case (c), but will not hold generically. It seems implausible that taxpayers will forego purchasing advice which produces and error-free tax return and removes audit risk.

Therefore, case (c) which implies that the uncertain taxpayers will randomize over purchasing advice. Then, the certain high taxable income taxpayers will only report high taxable income and the uncertain taxpayers will only report low taxable income. This case requires that parameter restrictions (1) and (2) hold. QED

Proposition 2: Under the conditions given in Theorem 2, the equilibrium of the game when taxpayers who receive perfect advice has the following strategies:

(1) taxpayers who are uncertain about their tax liability and obtain advice, report according to the report they receive from the tax preparer,

(2) certain taxpayers do not need to purchase advice,

(3) uncertain taxpayers do not purchase advice with probability

$$\pi = \frac{\delta(1-\beta)c}{(1-\delta)[\alpha(T+q)-c]},$$

(4) taxpayers who are certain they have high tax liability always report high tax liability $\overline{\omega^c} = 0$,

(5) taxpayers who are certain they have low taxable income report low taxable income,

(6) taxpayers who are uncertain about their tax liability and do not purchase advice report low with probability $\overline{\omega^{u}} = 1$,

(7) the tax agency audits returns reporting low taxable income that did not get advice with probability $\overline{p_n} = \frac{\alpha T + f}{(\alpha)(T + q) + h}$,

(8) the tax agency does not audit taxpayer reporting high taxable income, and

(9) the tax agency does not audit taxpayers who obtain advice.

Proof of Proposition 2: This proof follows directly from the proof for Theorem 2. I provide additional intuition for the solution here. If the H type taxpayers use a mixed strategy in reporting low tax liability, then the audit probability equals the following fraction, $\overline{p_n} = \frac{T}{T + q + h}$. If the U type taxpayers use a mixed strategy, then the audit probability equals the following fraction, $\overline{p_n} = \frac{T}{\alpha(T + q) + h}$. If the uncertain taxpayers use a mixed strategy over purchasing advice, the audit probability equals the following fraction, $\overline{p_n} = \frac{\alpha T + f}{(\alpha)(T + q) + h}$. As long as $\alpha < 1$ and condition (3) holds, then using the best reply correspondence for the H types and the best reply correspondence for the U type taxpayers, I find that

$\overline{p_n} = \frac{\alpha T + f}{(\alpha)(T + q) + h}$. It is less than $\frac{T}{\alpha(T + q) + h}$ and greater than $\frac{T}{T + q + h}$.

This satisfies the unique equilibrium where $\overline{\omega^{c}} = 0$, $\overline{\omega^{u}} = 1$, and $\pi = [0,1]$. The taxpayers who are certain they have high taxable income never report low taxable income. The uncertain taxpayers always report low taxable income. These taxpayers risk an audit by the tax agency. In addition, the uncertain taxpayers randomize over not getting advice. QED

Comparative Static Results for the Game with Perfect Advice

When perfect advice is available, the partial derivatives hold the same signs as when all taxpayers self-prepare. Advice may influence the magnitude of the change, but it does not influence the direction of the change.

Similar to when all taxpayers self-prepared, as the low tax liability increases, the audit probability decreases. The taxpayer has a choice between obtaining advice and not doing so. The tax agency realizes that some taxpayers will attempt to pay low tax liability when they should pay high tax liability. The tax agency is receiving a signal, the preparer's signature, on the return, which indicates if a taxpayer paid to receive perfect advice.

If the government changes the tax code to provide a larger deduction to taxpayers, the tax agency is more likely to audit taxpayers that report low tax liability and do not get advice. On the margin, the tax agency is performing more audits on these returns because it knows that a percentage of the returns are correct. The agency could realize additional revenue from performing more audits on this subset of returns.

Changes to the tax burden of high tax liability taxpayers affect the probability of audit differently than in the case of low tax liability changes. If the high tax liability increases, the probability of being audited increases. Suppose legislators agree to a new tax rate for the high taxable income citizen. These individuals observe this change. They realize that the low tax liability and the high tax liability are diverging (higher tax rate) from one another. If this taxpayer takes the deduction and reports low taxable income, their audit chances increase. The tax agency performs more audits to discover which taxpayers have high tax liability. As discussed earlier, the higher audit rate is due to the availability of advice.

Following from the two previous probabilities, if the tax savings increases, the audit probability increases. With perfect advice, the agency receives a signal that the return is error free, the tax preparer's signature. There is a revenue gain from increasing the number of audits.

If the government changes the tax rates, the probability of not purchasing advice changes. When the deduction available to low tax liability taxpayers decreases, the probability of not purchasing advice increases. If a low tax liability taxpayer must pay more, less after-tax income remains for tax preparer services. This discourages the taxpayer from purchasing advice. When the government increases the high tax liability, taxpayers are more likely to purchase advice. The uncertain taxpayer seeks advice to clarify if she is eligible for the deduction. Suppose the tax savings increases. A taxpayer is more likely to purchase advice. She wants to see if she can take advantage of an expected increase in after-tax income.

Probability Comparison

Taxpayers are concerned about the audit probability, and the tax agency is concerned about the probability that a taxpayer will report low tax liability. The probabilities both center on a taxpayer's decision to report low tax liability because reporting low tax liability triggers an audit.

As long as condition (21) holds, I find that the audit probability when all taxpayers self-prepare is greater than the audit probability when uncertain taxpayers can receive perfect advice. From the taxpayer's perspective, the tax preparer's fee is lower than the tax savings she expects to see if she escapes audit. Thus, with this fee structure, obtaining advice is utility enhancing for some taxpayers. The tax agency reaps the benefit of outside filtering that another market, the tax preparer service market, provides.

In addition, the uncertain taxpayers are more likely to report low taxable income when perfect advice is available. The uncertain taxpayers who do not receive advice report low taxable income with probability one. The certain high type taxpayers never report low.

Conclusion

Much of previous research has the tax agency commit to an audit policy and taxpayers do not have pre-advice private information. Many papers also exclude the tax preparer. With the increase in the number of returns prepared by a professional and the growth in the percentage of returns audited because of a specific preparer, the inclusion of the preparer into the model is necessary. The results indicate that the taxpayer's audit probability is dependent on the fee charged by the preparer. The presence of advice does not change the tax agency's audit behavior if the tax laws change.

However, taxpayers do alter their reporting behavior if the tax laws change. If the government increases the low tax liability, there is a higher probability of reporting low taxable income. Alternatively, if the legislature decides to increase the high tax liability, then the probability of reporting low tax liability decreases. It is easier for the tax agency to differentiate between taxpayers with low and high taxable income. Changes in the tax laws also affect whether a taxpayer will obtain advice. If the government increases the low tax liability, taxpayers are less likely to obtain advice. Taxpayers are more likely to get advice if high tax liability increases.

In reality, the tax preparer does not remove all uncertainty. The next step is to construct a model where the tax preparer's advice is uncertain. Perhaps, the tax preparer is not as knowledgeable about the tax system as she should be.[15] Additionally, when the taxpayer receives advice, she may not report as the preparer instructs with probability one. Chapter 3 covers this topic.

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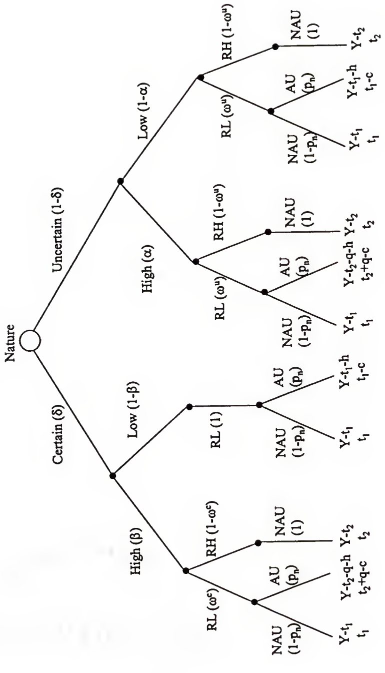
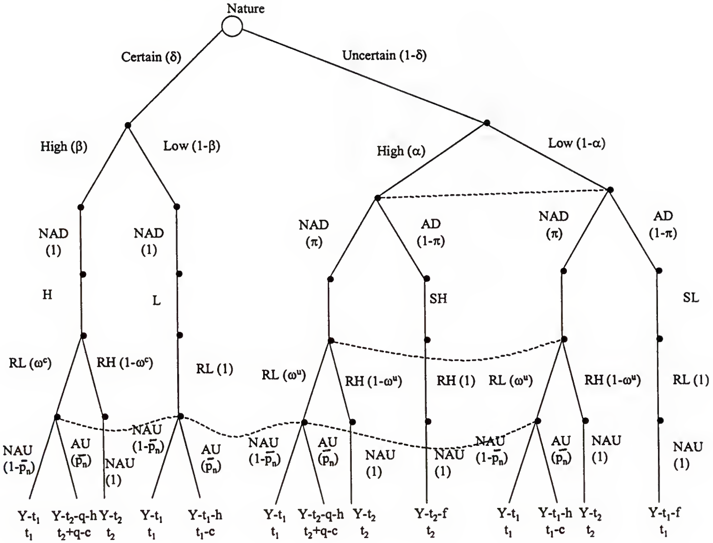
[15] A taxpayer's taxable income report depends on her risk preference, but this again will not enter into the models presented.



All Taxpayers Self-Prepare



Perfect Advice

CHAPTER 3

A THEORETICAL MODEL OF TAX PREPARER IMPACT ON TAX AUDIT AND COMPLIANCE RATES WITH IMPERFECT ADVICE

Introduction

As shown in Chapter 2, the taxpayer is more likely to report low tax liability when advice is available. The tax agency conducts fewer audits when perfect advice is available. Suppose the taxpayer as well as the tax preparer attempt to negotiate those "gray" areas, where some ambiguity exists, of the tax system and the advice is not perfect. In this chapter, I consider if tax preparer uncertainty changes the reporting strategy employed by taxpayers. In addition, the tax agency may change its audit policy because professional return preparation is not a signal of an error-free tax return.

The taxpayer wants to maximize her expected utility (or minimize her tax liability). The tax agency maximizes revenue minus audit costs. The taxpayer decides whether she wants to purchase advice. Regardless of the advice decision, the taxpayer also decides whether she wants to report high or low taxable income. The tax agency then considers whether to audit the tax return if the taxpayer claims low taxable income. I solve the equilibrium audit policy for the tax agency and the equilibrium reporting probability for the taxpayers.

The Game Tree with Unobservable Imperfect Advice

A fraction δ of the taxpayer population is certain that they have low taxable income. I labeled this type in the game tree as L. The other fraction $(1-\delta)$ are uncertain about their taxable income. I refer to this type as uncertain, U. A fraction α of the uncertain taxpayers have high taxable income, labeled UH in the game tree. The remaining 1-α has low taxable income, labeled UL in the game tree.[1] Thus, there are three taxpayer types.

The tax auditing game incorporates mixed strategies in the equilibrium of most interest, so it is useful to introduce the probabilities of playing some of the pure strategies at this point. Unlike the L type taxpayer, the U type taxpayers are uncertain about their taxable income. They can purchase advice to learn their taxable income. The probability that an uncertain taxpayer does not purchase advice is $\bar{\pi}$. The probability that an uncertain taxpayer does purchase advice is $1-\bar{\pi}$. I connect the information sets for uncertain taxpayers at the advice node. These taxpayers are uncertain about where they are in the game.

The U type taxpayers who purchase advice pay the tax preparer a fee *f* for the tax preparation service. The fee is a flat charge for tax return preparation. The tax preparer provides the taxpayer with a completed return. In the game presented in Chapter 2, the tax preparer provided the taxpayer with an error-free return, i.e. perfect advice. In this chapter, the advice is imperfect. There is some probability that the return has an error. The UH type taxpayers receive a high taxable income signal with probability γ_H and receive a low taxable income signal with probability 1- γ_H. The UL type taxpayers receive a high taxable income signal with probability γ_L and receive a low taxable income signal with probability 1- γ_L. Assume that $\gamma_L < \gamma_H$. UH type taxpayers are more likely to receive a high taxable income signal than UL-type taxpayers are.

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[1] In this game, β equals zero. In the previous chapter, a fraction β of taxpayers knew with certainty that they had high taxable income. These taxpayers do not exist in this game. I can compare the results in the previous chapter to this chapter by allowing β to equal zero.

Each taxpayer must report her taxable income. The L-type taxpayer is certain that she has low taxable income and reports low taxable income with probability *1*. The U type taxpayers who do not purchase advice to report low taxable income with probability $\overline{\overline{\omega^u}}$. I connect the information sets for the uncertain taxpayers who do not get advice indicating that these taxpayers are not sure where they are in the game. The U type taxpayers who purchase advice report low taxable income with probability *1* if they receive a low taxable income signal. The U type taxpayers who purchase advice report high taxable income with probability 1 if they receive a high signal.

I construct a player's expected payoff under the following assumptions. I assume that each taxpayer has the same income, Y. A taxpayer has either low taxable income, y_1, or high taxable income, y_2. The difference between having low taxable income and high taxable income is the ability to take a deduction. The taxpayers who do not purchase advice and report low taxable income still pay h if audited. The penalty for underreporting income is q. The tax agency's audit cost is c for auditing taxpayers who report low taxable income, regardless of their advice decision. Let me assume that the cost of an audit is less than the revenue gain from performing an audit. Thus, $c < T + q$.

The tax agency audits any taxpayer who reports low taxable income, with probability p_e. In the previous chapter, the tax agency did not audit taxpayers who received advice. The perfect advice served as a signal of an error-free return. In this game, purchasing advice does not remove all audit risk. The information sets at the audit nodes for all taxpayers reporting low are connected. This means that the tax agency does not observe the taxpayer's advice choice before conducting an audit. It treats all taxpayers reporting low taxable income in the same manner. If preparers did not need to sign returns, the tax agency could not easily identify professionally prepared returns at the stage of selecting returns for audit.

A taxpayer's after-tax income depends on which taxable income level they report, whether they purchase advice, and if the tax agency audits. If a taxpayer is certain that she has low taxable income, she reports low taxable income and does not seek advice from a tax preparer. If the tax agency does not audit her, she has an after-tax income of $Y - t_1$. However, if the tax agency does audit, her income is $Y - t_1 - h$ after an audit.

The uncertain taxpayers who do not purchase advice self-prepare their return and make a decision whether they should report high or low taxable income. Taxpayers who have low taxable income and report low taxable income have an income of $Y - t_1 - h$ after an audit. If the tax agency does not audit, they have an after-tax income of $Y - t_1$. Taxpayers who have high taxable income but report low taxable have an income of $Y - t_2 - q - h$ after an audit Taxpayers who have high taxable income and report high taxable income have an after-tax income of $Y - t_2$.

Taxpayers who obtain advice are either told they have low taxable income or high taxable income. The taxpayers who receive the high taxable income signal and report high taxable income have after-tax income of $Y - t_2 - f$. Taxpayers who obtain advice and receive a low taxable income signal report low taxable income. They also risk an audit in this game. Those who escape audit have an after-tax income of $Y - t_1 - f$. The individuals who do not escape audit have an income of $Y - t_2 - q - f$ if the audit reveals that they have high taxable income.

The tax agency receives different amounts of revenue based on whether they choose to audit. If the tax agency does not audit and the taxpayer has high taxable income, it receives t_2. If the taxpayer has low taxable income, it receives t_1. If the tax agency audits and the taxpayer has low taxable income, it receives $t_1 - c$. However, if an audit reveals that the taxpayer has high taxable income, it receives $t_2 + q - c$.

I observe three taxpayer types: UH, UL, and L. The taxpayers who are certain that they have low taxable income do not purchase advice report low taxable income. The uncertain taxpayer makes an advice choice. Then, she decides whether to report low taxable income or high taxable income. When the tax agency receives the return, it decides whether to audit. The tax agency does not audit taxpayers reporting high taxable income. As stated earlier, the taxpayers, regardless of their advice decision, reporting low taxable income risk an audit by the tax agency.

Equilibrium Strategy Conditions

The following restrictions on the parameters ensure that the equilibrium in the game in the most reasonable one. Actually, some equilibrium strategy conditions are the same as the ones presented in Chapter 2.

The following condition is the same as condition (1) in Chapter 2. It builds a relationship between the penalty and cost of tax evasion and tax savings from reporting low taxable income instead of high taxable income. The expected gain from filing low taxable income is T times the probability of being low taxable income while the cost is the hassle cost pain by all audited taxpayers plus the expected penalty paid by those with high taxable income. The condition below states that the expected audit cost to an uncertain taxpayer is greater than the expected tax savings from filing low taxable income. If this condition did not hold all uncertain taxpayers would file as having low taxable income even if the tax agency audited all such returns. This implies that:

(1) $\alpha q + h > (1-\alpha)T$.

The tax agency also calculates its expected audit cost. In the previous section, I assumed that $c < T + q$. Here I require a stronger condition. It states that the audit cost must lie below the expected revenue that the tax agency receives after a successful audit even if all taxpayers file as having low taxable income. The expected revenue depends on the proportion of taxpayers not eligible for the deduction and the fraction of taxpayers who are uncertain. This condition is the same as condition (2) in Chapter 2 if β is equal to zero. Thus, the following condition must hold for a mixed strategy equilibrium:

(2) $c < [\alpha(1-\delta)](T + q)$.

The following condition takes into account the imperfect advice that a taxpayer may receive. The expected penalty is fraction of high taxable income taxpayers times the probability of receiving a high taxable income signal if you have high taxable income times the penalty for underreporting income. The expected tax savings is the fraction of low taxable income taxpayers times the probability of receiving a high taxable income signal if you have low taxable income times the tax savings. The tax preparer fee *f* lies below the expected penalty plus the hassle cost minus the expected tax savings. Therefore, I have:

(3) $f < \alpha\gamma_H q + h - (1-\alpha)(\gamma_L)T$.

The condition below assists in narrowing the set of equilibrium strategies. The taxpayer's expected tax savings from obtaining advice is the probability of having low taxable income times the probability of receiving a low taxable income signal times the tax saving minus the tax preparer's fee. The expected penalty is the probability of having high taxable income times the probability of receiving a low taxable income signal. The expected tax savings must be greater than the expected penalty. Thus, this means:

$$(4) \qquad [(1-\alpha)(1-\gamma_L)](T)-f>\alpha(1-\gamma_H)q.$$

Probability of Audit

The best reply correspondence is identical to the one presented in the self-preparation game and the perfect advice game. The expected value of not auditing taxpayers who report low taxable income and the expected value of auditing taxpayers who report low taxable income are not the same. In particular, the tax agency cannot observe the taxpayer's decision to get advice, and the advice is imperfect. The expected revenues, $EV^A(\overline{AU})$ and $EV^A(\overline{NAU})$, depend on the taxpayers strategies, $\overline{\overline{\omega^u}}$ and $\overline{\pi}$. Thus, the expected value of not auditing taxpayers who report low taxable income is equal to:

$$(5) \qquad EV^A(\overline{NAU})=\delta t_1+(1-\delta)(1-\overline{\pi})t_1+(1-\delta)\overline{\pi}\overline{\overline{\omega^u}}t_1.$$

The expected value of auditing taxpayers who report low taxable income is equal to:

$$(6) \qquad EV^A(\overline{AU})=\delta(t_1-c)+\alpha(1-\delta)\left[(1-\overline{\pi})+\overline{\pi}\overline{\overline{\omega^u}}\right](t_2+q)$$

$$-(1-\delta)\left[(1-\overline{\pi})+\overline{\pi}\overline{\overline{\omega^u}}\right]c+(1-\alpha)(1-\delta)\left[(1-\overline{\pi})+\overline{\pi}\overline{\overline{\omega^u}}\right](t_1).$$

Substituting and rearranging terms, the agency's best reply correspondence can be written as:

$$(7) \qquad p_e=\begin{matrix}0\\ [0,1]\\ 1\end{matrix}\ \text{if}\left[(1-\delta)(1-\overline{\pi})+\delta+(1-\delta)(\overline{\pi})\overline{\overline{\omega^u}}\right]c\begin{matrix}>\\ =\\ <\end{matrix}\alpha(1-\delta)\left[(1-\overline{\pi})+\overline{\pi}\overline{\overline{\omega^u}}\right](T+q),$$

where $p_e = [0,1]$ means the tax agency is indifferent between any audit rate between 0 and 1.

Probability of Reporting Low Taxable Income

As far as reporting probabilities, the game is similar to previous games, but instead of p_n or $\overline{p_n}$, the audit probability is p_e. Taxpayers take the tax agency's audit probability as given. Substituting and rearranging terms, the best reply correspondence for the U type taxpayers is:

$$\text{(8)} \qquad \overline{\overline{\omega}}^{u} = \begin{matrix} 0 \\ [0,1] \\ 1 \end{matrix} \text{ if} (1-\alpha p_e)T \begin{matrix} > \\ = \\ < \end{matrix} p_e(\alpha q + h),$$

where $\overline{\overline{\omega}}^{u} = [0,1]$ means that the taxpayer is indifferent between reporting low taxable income and high taxable income.

Probability of Not Purchasing Advice

There is some probability $\overline{\pi}$ that a taxpayer will not purchase advice for the fee *f*. The best reply correspondence for uncertain taxpayers over advice is:

$$\text{(9)} \qquad \overline{\pi} = 0 \qquad \text{if } EV^{P}\left(\overline{AD}\right) > EV^{P}\left(\overline{NAD}\right),$$

$$\text{(10)} \qquad \overline{\pi} = [0,1] \qquad \text{if } EV^{P}\left(\overline{AD}\right) = EV^{P}\left(\overline{NAD}\right), \text{ and}$$

$$\text{(11)} \qquad \overline{\pi} = 1 \qquad \text{if } EV^{P}\left(\overline{AD}\right) < EV^{P}\left(\overline{NAD}\right).$$

Condition (9) and condition (11) define pure strategies. Condition (9) states that the taxpayer purchases advice if the expected value of obtaining advice is greater than the expected value of not obtaining advice. Condition (11) states that the taxpayer does not purchase advice if the expected value of not obtaining advice is greater than the expected value of obtaining advice. If the taxpayer plays a mixed strategy, condition (10) must hold. The taxpayer will randomly choose to not purchase advice if the expected value of obtaining advice equals the expected value of not obtaining advice.

Using the taxpayers' payoffs, the expected value of obtaining advice is:

$$(12)\qquad EV^{P}(AD) = Y - t_1 - f - [\alpha\gamma_H + (1-\alpha)\gamma_L]T + \alpha(\gamma_H - 1)p_e(T + q).$$

The expected value of not obtaining advice is:

$$(13)\qquad EV^{P}(NAD) = Y - t_1 - p_e h - \alpha p_e(T + q).$$

Substituting and rearranging terms, the uncertain taxpayer's best reply correspondence is:

$$(14)\qquad \bar{\pi} = \begin{matrix} 0 \\ [0,1] \\ 1 \end{matrix} \text{ if} [\alpha\gamma_H(1-p_e) + (1-\alpha)(\gamma_L)]T + f \begin{matrix} > \\ = \\ < \end{matrix} p_e(\alpha\gamma_H q + h).$$

Equilibrium Strategies for the Game with Unobservable Imperfect Advice

Theorem 3: The game when uncertain taxpayers can purchase unobservable imperfect advice has an equilibrium, which is in mixed strategies, exists when parameter restriction (1) and (2) hold.

Proof of Theorem 3: Suppose the tax agency uses a pure strategy. Assume the tax agency does not audit any tax returns that report low taxable income, $p_e = 0$. Then, from the best reply correspondences, the uncertain taxpayers will report low taxable income, $\overline{\overline{\omega}}^{\mathrm{u}} = 1$. In addition, the uncertain taxpayers will not purchase advice with probability *1*, $\bar{\pi} = 1$. Substituting these values, condition (8) reduces to $p_e = \begin{matrix} 0 \\ [0,1] \\ 1 \end{matrix}$ if $c \begin{matrix} > \\ = \\ < \end{matrix} [\alpha(1-\delta)](T + q)$. Condition (2) implies that $c < [\alpha(1-\delta)](T + q)$ which implies $p_e = 1$, a contradiction. Therefore, $p_e = 0$ is not an equilibrium.

Further, suppose the tax agency audits all taxpayers who report low taxable income, $p_e = 1$. Then, all uncertain taxpayers will purchase advice, $\overline{\pi} = 0$. Furthermore, condition (1) implies that $\overline{\overline{\omega}}^u = 0$. Condition (8) implies that $p_e = 0$, a contradiction.

The tax agency uses a mixed strategy in auditing taxpayers who report low taxable income, $p_e = [0,1]$. Now consider, $\overline{\overline{\omega}}^u$ and $\overline{\pi}$ as argued above, $\overline{\overline{\omega}}^u = \overline{\pi} = 0$ and $\overline{\overline{\omega}}^u = \overline{\pi} = 1$ are inconsistent with $p_e = [0,1]$. Now note that $\frac{[\alpha\gamma_H - (1-\alpha)\gamma_L]T + f}{(\alpha\gamma_H)(T + q) + h} < \frac{T}{\alpha(T + q) + h}$. This for example rules out the following cases:

(a) $\overline{\overline{\omega}}^u = [0,1]$, $\overline{\pi} = 0$,

(b) $\overline{\overline{\omega}}^u = 1$, $\overline{\pi} = 0$,

(c) $\overline{\overline{\omega}}^u = 1$, $\overline{\pi} = [0,1]$, and

(d) $\overline{\overline{\omega}}^u = \overline{\pi} = [0,1]$.

Hence, in conditions (8) and (14), the only condition possible is $\overline{\overline{\omega}}^u = [0,1]$ and $\pi = 1$. Therefore, this case implies that the uncertain taxpayers will randomize over purchasing advice. In addition, these taxpayers do not purchase advice. This case requires that parameter restrictions (1) and (2) hold. QED

Proposition 3: Under the conditions given in Theorem 3, the equilibrium of the game with unobservable imperfect advice has the following strategies:

(1) taxpayers who are certain that they have low taxable income do not purchase advice and report low taxable income,

(2) uncertain taxpayers do not purchase advice with probability $\overline{\pi} = 1$,

(3) taxpayers who are uncertain about their taxable income report low taxable income

with probability $\overline{\overline{\omega^u}} = \dfrac{\delta c}{(1-\delta)[\alpha(T+q)-c]}$,

(4) the tax agency audits returns reporting low taxable income with probability

$p_e = \dfrac{T}{\alpha(T+q)+h}$, and

(5) the tax agency does not audit returns reporting high taxable income.

Proof of Proposition 3: The proof of this proposition follows directly from Theorem 3 above. Let me present some additional intuition for the solution here. If the taxpayer uses a mixed strategy regarding purchasing advice, then condition (14) becomes the following fraction, which represents the tax agency's audit probability,

$p_e = \dfrac{[\alpha\gamma_H - (1-\alpha)\gamma_L]T + f}{(\alpha\gamma_H)(T+q)+h}$. If the taxpayer uses a mixed strategy regarding reporting low taxable income, then condition (11) becomes the following fraction, which represents the tax agency's audit probability, $p_e = \dfrac{T}{\alpha(T+q)+h}$. As long as $\alpha < 1$, then I find that

$$\frac{[\alpha\gamma_H - (1-\alpha)\gamma_L]T + f}{(\alpha\gamma_H)(T+q)+h} < \frac{T}{\alpha(T+q)+h}.$$

This satisfies the equilibrium where $\overline{\pi} = 1$ and $\overline{\overline{\omega^u}} = [0,1]$. The uncertain taxpayers do not purchase the imperfect advice. They then play a mixed strategy over reporting. These taxpayers risk an audit by the tax agency. Derived from the reporting probability, the equilibrium audit strategy is $p_e = \dfrac{T}{\alpha(T+q)+h}$. QED

The tax agency uses the same audit policy and taxpayers play a mixed strategy over their taxable income report as in the game where all taxpayers self-prepared their returns. Unlike the perfect advice game where uncertain taxpayers play a mixed strategy over purchasing advice, the uncertain taxpayers in this game never purchase advice. This may result from the tax agency's inability to observe the taxpayer's advice decision. After discussing the comparative static results for this game, I model a game where the tax agency can observe the advice decision and chooses to use a separate audit policy for taxpayers that received advice and those who did not.

Comparative Static Results for the Game with Unobservable Imperfect Advice

It is important to recognize how changes in the tax burden will influence the tax agency's audit policy.[2] The comparative static results for p_n, the audit probability when all taxpayers self-prepare, and p_e, the audit probability when unobservable imperfect advice is available, are the same. Let me briefly review the results. As the low tax liability increases, the probability that the tax agency audits decreases. As the high tax liability increases, the probability that the tax agency audits increases. Following these results, as the tax savings, T, increases, the probability that the tax agency audits taxpayers reporting low taxable income increases.

The comparative static results for the reporting probability from the self-preparation game and this game are the same, assuming β equals zero. As the low tax liability increases, the probability that an uncertain taxpayer reports low taxable income increases. As the high tax liability increases, the probability that an uncertain taxpayer reports high taxable income decreases. As the tax savings increases, taxpayers are less likely to report low taxable income.

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[2] Since $p_n = p_e$, see Appendix A for comparative static results.

The Game Tree with Observable Imperfect Advice

Now I assume that the purchase of advice is observable by the tax agency.[3] The fraction δ of the taxpayer population, the low taxable income taxpayers, L, know with certainty that they have low taxable income. The fraction $1\text{-}\delta$ of the taxpayer population, the uncertain taxpayers, U, do not know their taxable income level. They have either high taxable income, H, or low taxable income, L. A fraction α has high taxable income, and a fraction $1\text{-}\alpha$ has low taxable income. Thus, parallel to the unobservable imperfect advice game, there are three taxpayer types in the game.

As above in the game tree with unobservable imperfect advice, the equilibrium of interest involves mixed strategies on the part of some players. The L type taxpayer does not purchase advice because she does not need advice. She is certain that she has low taxable income. The uncertain taxpayers can learn their taxable income level by purchasing advice. The probability that an uncertain taxpayer purchases advice is $1-\pi_1-\pi_2$. The probability that an uncertain taxpayer does not purchase advice and reports high taxable income is π_1. The probability that an uncertain taxpayer does not purchase advice and reports low taxable income is π_2.

The L type taxpayers report low taxable income. The taxpayers who do not purchase advice and remain uncertain report either low taxable income or high taxable income. The preparer's advice does not resolve all uncertainty. The UL type taxpayers receive a high taxable income signal with probability γ_L. The UH type taxpayers receive a high taxable income signal with probability γ_H. Taxpayers who receive a high taxable income signal report low taxable income with probability θ and report high taxable income with probability $1 - \theta$.

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[3] See the end of the chapter for the game tree labeled "Observable Imperfect Advice."

Assume that the tax agency can observe the advice a taxpayer receives. Thus, the tax agency will use a different audit policy for taxpayers who do not receive advice and taxpayers who do receive advice. With probability $\hat{p}_e$, the tax agency audits individuals who get advice and report low taxable income. The tax agency uses a different audit policy for those who do not get advice and report low taxable income. It is $\tilde{p}_e$. The tax agency does not audit taxpayers who report high taxable income because these taxpayers pay the highest tax liability possible. If the agency performs an audit, it would lose audit cost c and not gain any additional revenue.

I construct players' payoffs under the following assumptions. Let me assume that all taxpayers have the same income, Y. If the taxpayer does not get advice, reports low taxable income, and the tax agency audits, she pays the hassle cost h. If a taxpayer who reports low taxable income undergoes an audit and the audit reveals that she has high taxable income, the taxpayer pays a penalty q, which is a function of T, the tax savings. Additionally, the tax agency pays an audit cost, c, to audit taxpayers reporting low taxable income. The audit cost must be less than expected gain from auditing. Therefore, $c < T + q$.

Taxpayers reporting high taxable income and taxpayers reporting low taxable income that the tax agency does not audit do not incur a penalty. The high taxable income taxpayers have an after-tax income of $Y - t_2$. The low taxable income taxpayers have an after-tax income of $Y - t_1$.

If the tax agency audits a taxpayer, the audit reveals their taxable income level with certainty. Even though preparer advice has ambiguities, the audits identify taxable income status. The signal is not verifiable for the tax agency, so penalties cannot differ according to the signal received. If a taxpayers reports low taxable income without advice but has high taxable income, her income after the audit is $Y - t_2 - q - h$. If the taxpayer reports low taxable income without advice and has low taxable income, her income after the audit is $Y - t_1 - h$.

The tax preparer tells uncertain taxpayers who obtain advice if they have low taxable income or high taxable income. Taxpayers who obtain advice and receive a low taxable income signal report low taxable income. They also risk an audit in this game. Those who the tax agency does not audit have an after-tax income of $Y - t_1 - f$. The individuals who do not escape audit have an income of $Y - t_2 - q - f$ if the audit reveals that they have high taxable income.

In the perfect advice game, taxpayers who received the high taxable income signal reported high taxable income. This is not true in this game. The taxpayers who receive the high taxable income signal may report high taxable income and have an after-tax income of $Y - t_2 - f$. The taxpayers who receive the high taxable income signal may also report low taxable income. Those that the tax agency does not audit have an after-tax income of $Y - t_1 - f$. If the tax agency audits and it reveals that the taxpayer has low taxable income, she has an income of $Y - t_1 - f$. If the tax agency audits and it reveals that the taxpayer has high taxable income, she has an income of $Y - t_2 - q - f$.

If the tax agency does not audit and the taxpayer has high taxable income, it receives t_2. If the taxpayer has low taxable income, it receives t_1. If the tax agency audits and the taxpayer has low taxable income, it receives $t_1 - c$. However, if an audit reveals that the taxpayer has high taxable income, it receives $t_2 + q - c$.

Equilibrium Strategy Conditions

Condition (2) continues to hold in this game, which states that the audit cost must lie below the expected revenue that the tax agency receives after a successful audit even if all taxpayers file as having low taxable income.

The next condition states that the fee for tax advice must be less than the expected tax savings for a taxpayer who does not purchase advice. If the condition does not hold, taxpayers would report high taxable income even if the tax agency audits all such returns. Thus, this implies:

(15) $f < (1 - \tilde{p}_e)(\alpha)(T + q) + h$.

The following condition creates a relationship between tax savings and the penalty. If the tax agency does not audit all uncertain taxpayers that receive tax preparer advice to report high taxable income, then it holds. Otherwise, the tax agency would audit all uncertain taxpayers receiving advice. Therefore, I find that:

(16) $(1 - \alpha)\gamma_L T < \alpha \gamma_H q$.

Probabilities of Audit

The best reply correspondence remains unchanged, but again the expected values change. As noted above, the tax agency observes the imperfect advice received by some uncertain taxpayers. The expected revenues, $EV^A\left(\overline{\overline{AU}}\right)$ and $EV^A\left(\overline{\overline{NAU}}\right)$, depend on the taxpayers strategy, θ. Thus, the expected value of not auditing taxpayers who receive advice and report low tax liability is equal to:

(17) $EV^A\left(\overline{\overline{NAU}}\right) = \alpha(1 - \delta)(\gamma_H)(\theta)(t_1) + \alpha(1 - \delta)(1 - \gamma_H)(t_1)$

$$+(1-\alpha)(1-\delta)(\theta)(\gamma_L)(t_1)+(1-\alpha)(1-\delta)(1-\gamma_L)(t_1).$$

The expected value of auditing taxpayers who receive advice and report low tax liability is equal to:

$$(18)\qquad EV^A\left(\overline{\overline{AU}}\right)=\alpha(1-\delta)(\gamma_H)(\theta)(t_2+q-c)+\alpha(1-\delta)(1-\gamma_H)(t_2+q-c)$$
$$+(1-\alpha)(1-\delta)(\theta)(\gamma_L)(t_1-c)+(1-\alpha)(1-\delta)(1-\gamma_L)(t_1-c).$$

Substituting and rearranging terms, the tax agency's best reply correspondence for the taxpayers who obtain advice can be written as:

$$(19)\qquad \hat{p}_e=\begin{matrix}0\\ [0,1]\\ 1\end{matrix}\ \text{if}(1-\alpha)(\gamma_L)(\theta)c-\alpha(\gamma_H)(\theta)(T+q-c)$$
$$\begin{matrix}>\\ =\\ <\end{matrix}\alpha(1-\gamma_H)(T+q-c)-(1-\alpha)(1-\gamma_L)(c),$$

where $\hat{p}_e=[0,1]$ means that the tax agency is indifferent between any audit rate between 0 and 1.

There is an additional audit probability for taxpayers who did not get advice. The expected revenues, $EV^A\left(\overline{\overline{AU}}\right)$ and $EV^A\left(\overline{\overline{NAU}}\right)$, depend on the taxpayers strategy, π_2.

The expected value of not auditing taxpayers who do not receive advice and report low tax liability is equal to:

$$(20)\qquad EV^A\left(\overline{\overline{NAU}}\right)=(1-\delta)(\pi_2)t_1+\delta t_1.$$

The expected value of auditing those who do not receive advice and report low tax liability is equal to:

(21) $$EV^{A}\left(\overline{\overline{AU}}\right) = [\delta + (1-\delta)(\pi_2)](t_1 - c) + \alpha(1-\delta)(\pi_2)(t_2 - t_1 + q).$$

Substituting and rearranging terms, the tax agency's best reply correspondence for taxpayers who do not obtain advice can be written as:

(22) $$\tilde{p}_e = \overset{0}{\underset{1}{[0,1]}} \text{ if} [\delta + (1-\delta)(\pi_2)]c \overset{>}{\underset{<}{=}} \alpha(1-\delta)(\pi_2)(T + q),$$

where $\tilde{p}_e = [0,1]$ means that the tax agency is indifferent between any audit rate between 0 and 1.

Probability of Not Purchasing Advice and Reporting High Taxable Income

Since obtaining advice is a choice, there is some probability π_1 that a taxpayer will not purchase advice for the fee *f*. The best reply correspondence for uncertain taxpayers, comparing their advice choice, is:

(23) $\pi_1 = 0$ if $EV^{P}\left(\overline{\overline{AD}}\right) > EV^{P}\left(\overline{RH}\right)$,

(24) $\pi_1 = [0,1]$ if $EV^{P}\left(\overline{\overline{AD}}\right) = EV^{P}\left(\overline{RH}\right)$, and

(25) $\pi_1 = 1$ if $EV^{P}\left(\overline{\overline{AD}}\right) < EV^{P}\left(\overline{RH}\right)$.

Conditions (23) and (25) define pure strategies. Condition (23) states that the uncertain taxpayer will purchase advice if the expected value of purchasing advice is greater than the expected value of reporting high taxable income. Condition (25) states that the uncertain taxpayer will not purchase advice if the expected value of not purchasing advice is greater than the expected value of reporting high taxable income. Condition (24) specifies a mixed strategy where the taxpayer randomly purchases advice. The expected value of purchasing advice is equal to the expected value of reporting high taxable income.

I connect the information sets for uncertain taxpayers at the advice node indicating that they are not sure where they are in the game. Some fraction α of these taxpayers has high taxable income. The other *1* - *α* of taxpayers has low taxable income. The expected value of obtaining advice is:

(26) $$EV^{P}\left(\overline{\overline{AD}}\right) = Y - t_1 - f - \alpha\hat{p}_e(T+q).$$

The expected value of reporting high taxable income without purchasing advice is:

(27) $$EV^{P}\left(\overline{RH}\right) = Y - t_2 .$$

Therefore, taxpayers will not report high taxable income without advice if the condition below holds:

(28) $$\pi_1 = 0 \text{ if } f < \left(1 - \frac{(1-\alpha)\gamma_L + \alpha\gamma_H}{\gamma_H}\right)T .$$

Probability of Not Purchasing Advice and Reporting Low Taxable Income

There is some probability π_2 that a taxpayer will not purchase advice for the fee *f*. The best reply correspondence for uncertain taxpayers, comparing their advice choice, is:

(29) $$\pi_2 = 0 \qquad \text{if } EV^{P}\left(\overline{\overline{\overline{AD}}}\right) > EV^{P}\left(\overline{RL}\right),$$

(30) $$\pi_2 = [0,1] \qquad \text{if } EV^{P}\left(\overline{\overline{\overline{AD}}}\right) = EV^{P}\left(\overline{RL}\right), \text{ and}$$

(31) $$\pi_2 = 1 \qquad \text{if } EV^{P}\left(\overline{\overline{\overline{AD}}}\right) < EV^{P}\left(\overline{RL}\right).$$

The expected value of obtaining advice is:

(32) $$EV^{P}\left(\overline{\overline{AD}}\right) = Y - t_1 - f - \alpha\hat{p}_e(T+q).$$

The expected value of not obtaining advice is:

$$(33) \qquad EV^{P}\left(\overline{RL}\right) = Y - t_1 - \tilde{p}_e h - \alpha\tilde{p}_e (T + q).$$

Substituting and rearranging terms, the taxpayer's best reply correspondence can be written as:

$$(34) \qquad \pi_2 = \begin{matrix} 0 \\ [0,1] \\ 1 \end{matrix} \text{ if } \alpha(\hat{p}_e)(T + q) + f \begin{matrix} > \\ = \\ < \end{matrix} \tilde{p}_e(\alpha T + \alpha q + h),$$

where $\pi_2 = [0,1]$ means that the uncertain taxpayer is indifferent between obtaining advice and reporting low taxable income.

Probability of Reporting Low Taxable Income if Received High Taxable Income Signal

Taxpayers who receive the high taxable income signal may not follow the advice. The probability that a taxpayer who received a high taxable income signal reports low taxable income is θ. The taxpayer takes audit rates as given. The best reply correspondence for uncertain taxpayers receiving the high taxable income signal depends on whether the taxpayer reports low taxable income or high taxable income. Therefore:

$$(35) \qquad \theta = 0 \qquad \text{if } EV^{P}\left(\overline{\overline{RL}}\right) < EV^{P}\left(\overline{\overline{RH}}\right),$$

$$(36) \qquad \theta = [0,1] \qquad \text{if } EV^{P}\left(\overline{\overline{RL}}\right) = EV^{P}\left(\overline{\overline{RH}}\right), \text{ and}$$

$$(37) \qquad \theta = 1 \qquad \text{if } EV^{P}\left(\overline{\overline{RL}}\right) > EV^{P}\left(\overline{\overline{RH}}\right).$$

The expected value of reporting low taxable income if the tax preparer tells the taxpayer that she is high taxable income is:

$$(38) \quad EV^{P}\left(\overline{\overline{RL}}\right) = [\alpha(1-\delta)(\gamma_H) + (1-\alpha)(1-\delta)(\gamma_L)](Y - t_1 - f) - \alpha(1-\delta)(\gamma_H)(\hat{p}_e)(T + q).$$

The expected value of reporting high taxable income if the tax preparer tells the taxpayer that she is high taxable income is:

(39) $$EV^{P}\left(\overline{RH}\right)=\alpha(1-\delta)(\gamma_{H})(Y-t_{2}-f)+(1-\alpha)(1-\delta)(\gamma_{L})(Y-t_{2}-f).$$

Substituting and rearranging terms, the taxpayer's best reply correspondence is:

(40) $$\theta=\underset{1}{\overset{0}{[0,1]}}\text{ if }\alpha(1-\delta)(\gamma_{H})(\hat{p}_{e})(T+q)\underset{>}{\overset{<}{=}}[(1-\alpha)(1-\delta)\gamma_{L}+\alpha(1-\delta)\gamma_{H}]T,$$

where $\theta=[0,1]$ means that the taxpayer is indifferent between reporting low taxable income or high taxable income.

Equilibrium Strategies for the Game with Observable Imperfect Advice

Theorem 4: The game when uncertain taxpayers can purchase observable imperfect advice has a unique equilibrium which is in mixed strategies exists when parameter restriction (2), (15), and (16) hold.

Proof of Theorem 4: Suppose the tax agency uses a pure strategy. The tax agency does not audit taxpayers who get advice and report low taxable income. Thus, $\hat{p}_{e}=0$. Then, from condition (40), the uncertain taxpayers report low taxable income if they received a high taxable income signal is equal to *one*. Therefore, $\theta=1$. Substituting this value, condition (19) becomes $\hat{p}_{e}=\underset{1}{\overset{0}{[0,1]}}$ if $c\underset{<}{\overset{>}{=}}[\alpha(1-\delta)](T+q)$. Condition (2) implies that $c<\alpha(1-\delta)(T+q)$ which implies $\hat{p}_{e}=1$, a contradiction. Further, suppose that the tax agency audits all taxpayers who get advice and report low taxable income, $\hat{p}_{e}=1$. Therefore, $\theta=0$. Condition (19) implies that $\hat{p}_{e}=0$, a contradiction.

Further, suppose that the tax agency does not audit taxpayers who do not obtain advice and report low taxable income. This means that $\tilde{p}_{e}=0$. From condition (34), 0

this implies that $\pi_2 = 1$. Substituting this value, condition (22) reduces to $\tilde{p}_e = [0,1]$

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if $c = \alpha(1-\delta)(T+q)$. Condition (2) implies that $c < \alpha(1-\delta)(T+q)$ which implies

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$\tilde{p}_e = 1$, a contradiction. Suppose $\tilde{p}_e = 1$. This means that the tax agency audits all uncertain taxpayers who do not obtain advice and report low taxable income. If $\pi_2 = 0$, then condition (22) implies that $\tilde{p}_e = 0$, a contradiction.

The equilibrium involves the tax agency using a mixed auditing strategy for taxpayers who do and do not obtain advice. Thus, $\hat{p}_e = [0,1]$ and $\tilde{p}_e = [0,1]$. Using this result in combination with condition (34) and condition (40), I can obtain values for θ and π_2. Notice that $\theta = [0,1]$ and $\pi_2 = [0,1]$. Also, if condition (28) holds, $\pi_1 = 0$. Uncertain taxpayers will not report high taxable income. QED

Proposition 4: Under the conditions given in Theorem 4, the equilibrium of the game with observable imperfect advice has the following strategies:

(1) taxpayers who are uncertain do not purchase advice with probability $\pi_2 = \frac{\delta c}{(1-\delta)[\alpha(T+q)-c]}$ and then report low taxable income with probability *1*,

(2) taxpayers who are certain that they have low taxable income report low taxable income,

(3) taxpayers who purchased advice and get a low signal report low taxable income,

(4) taxpayers who purchase advice and get a high signal report low taxable income with probability $\theta = 1 - \frac{\alpha(T+q-c)-(1-\alpha)(c)}{\alpha(\gamma_H)(T+q-c)-(1-\alpha)(\gamma_L)(c)}$

(5) the tax agency audits those taxpayers who get advice with probability

$$\hat{p}_e = \frac{[(1-\alpha)\gamma_L + \alpha\gamma_H]T}{\alpha\gamma_H(T+q)},$$

(6) the tax agency chooses to audit the no advice taxpayers with

probability $\tilde{p}_e = \dfrac{[(1-\alpha)(\gamma_L) + \alpha\gamma_H]T + \gamma_H f}{\alpha\gamma_H(T+q) + \gamma_H h}$, and

(7) the tax agency does not audit taxpayers who report high taxable income.

Proof of Proposition 4: The proof of Proposition 4 follows directly from the proof for Theorem 4. The tax agency uses two different audit policies, one for those taxpayers who obtained advice and one for those who did not, in this game. The differential audit policy is a result of being able to observe the taxpayer's advice decision. Uncertain taxpayers who purchased advice play a mixed strategy and report low taxable income as was the case in the perfect advice game. Uncertain taxpayers who did not purchase advice also play a mixed strategy over reporting low taxable income. QED

Comparative Static Results for the Game with Observable Imperfect Advice

The comparative static results for the probability that a taxpayer does not purchase advice and reports low taxable income, π_2, are the same as the comparative static results for π in the perfect advice game except there are no taxpayers who are certain that they have high taxable income. Thus, β equals zero.

Since θ, $\hat{p}_e$, and $\tilde{p}_e$ are new measures, I calculated comparative static results for them. As stated earlier, I will only discuss tax rate changes in the chapter. Appendix A contains other comparative static results.

As the low tax liability increases, the probability that an uncertain taxpayer who receives a high taxable income signal will report low taxable income increases. Yet, as the high taxable income increases, the probability decreases. As the low tax liability approaches the high tax liability, taxpayers are willing to take the chance and report low taxable income. However, if the government increases the high tax liability, taxpayers will not take the chance and report low taxable income. The taxpayer realizes that the probability of detection by the tax agency may increase. Following from these results, as the tax savings increases, the probability that a taxpayer who receives a high taxable income signal will report low taxable income decreases.

Note that the tax agency uses two different audit probabilities in this game. However, changes in tax liability and tax savings produce the same outcome. If the government increases the low tax liability, the tax agency decreases its audit activity. The tax agency realizes that fewer taxpayers may attempt to report low taxable income. Since taxpayer's advice decision is observable, the tax agency conducts fewer audits as the low taxable income approaches the high taxable income. If the government increases the high tax liability, the tax agency increases its audit activity. In this case, more taxpayers may try to report low taxable income. The tax agency responds by increasing their frequency of audits. Following from the two previous results, as the tax savings increases, the tax agency increases its audit activity.

Probability Comparison

After reviewing the equilibrium strategies in Chapter 2, the solution to the game with no advice provides essentially the same solution as this game. The tax agency returns to a mixed audit strategy. The tax agency has the same audit probability. When taxpayers receive perfect advice, the uncertain taxpayers report low tax liability. Yet, when the advice is unobservable and imperfect, the uncertain taxpayers play a mixed strategy. The probability of reporting low tax liability is lower in the imperfect unobservable advice game. Comparing the reporting probability in the game with all taxpayers self-preparing, I find that taxpayers are less likely to report low tax.

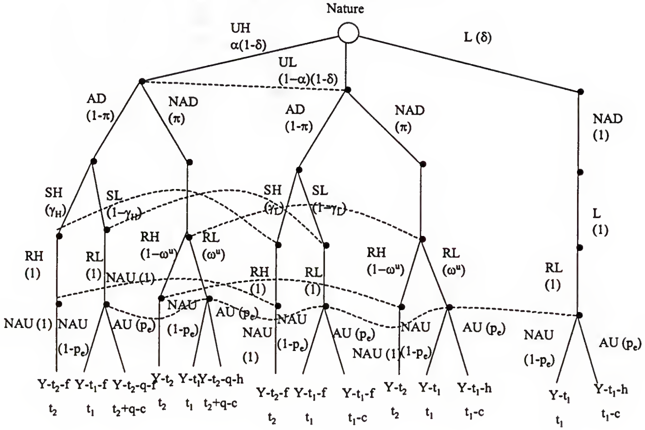
I must comment on the strategies employed by players in this chapter when advice is and is not observable. When advice is unobservable, taxpayers do not purchase advice. However, even though the advice is not perfect as in the game presented in Chapter 2, taxpayers do purchase advice when it is observable to the tax agency. Obtaining the observable tax advice changes a taxpayer's audit probability. Some taxpayers are willing to obtain advice for the change in audit risk.

In Chapter 2, I stated that the tax agency performs more audits when all taxpayers self-prepare. For the audit probability for taxpayers who did not get advice to be less than the audit probability for taxpayers who did get advice, thus $\hat{p}_e < \tilde{p}_e$, then the following must hold true, $\frac{h}{f} < \frac{\alpha\gamma_H(T+q)}{[(1-\alpha)\gamma_L + \alpha\gamma_H]T}$. The fraction on the right-hand side is greater than *1*, $\frac{\alpha\gamma_H(T+q)}{[(1-\alpha)\gamma_L + \alpha\gamma_H]T} > 1$, from condition (16).

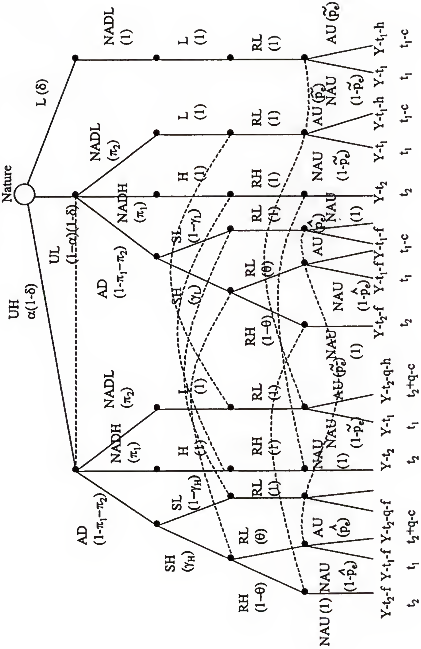
Conclusion

Introducing additional uncertainty into the model does provide a different result than a model with absolute certainty over tax preparer skills. In fact, if the preparer provides the taxpayer with unobservable imperfect tax return advice, the results match those of when taxpayers are unable to obtain tax assistance. However, in the game where the imperfect advice is observable, taxpayers do purchase advice randomly. In addition, I observe that the tax agency uses two different audit strategies when it can observe taxpayer advice. The relationship between the hassle cost and the tax preparation fee determine which taxpayer type undergoes more audits by the tax agency. This certifies the need for a less complex tax system. If tax reform does not provide a simpler tax system, continuous education for taxpayers and tax preparers and the mutual understanding that some tax issues come close to legal tax avoidance will assist all parties understand how to improve compliance.

Unobservable Imperfect Advice



Observable Imperfect Advice



CHAPTER 4
AN EMPIRICAL MODEL OF THE INFLUENCE OF AUDIT LEVELS AND TAX POLICY CHANGES ON TAX PREPARER USAGE BY TAXPAYERS WHO ITEMIZE

Introduction

As tax preparer usage grows, from 50 percent in the late 1980s to 56 percent in the mid 1990s, characterizing taxpayers who seek their services is imperative.[1] Previous studies established the tax preparer's role after the Tax Revenue Act of 1986. However, there is a lack of research since the passage of more recent legislation.

The purpose of this paper is to look at the determinants of preparer usage occurring after the passage of the Revenue Reconciliation Act of 1993 (RRA 93). The available data are limited and do not contain demographic information. I am using the 1994 Individual Public-Use Microdata File (IMF) from the Internal Revenue Service. The data are from unaudited returns with aggregated audit information from another source. I construct the audit probabilities to allow for a more thorough view of taxpayer behavior. The analysis uses a logit model, which is appropriate for a dichotomous dependent variable (tax preparer use).

The logit model used in the paper identifies characteristics of those who have their tax returns professionally prepared.[2] The model includes the tax law variables of previous studies as well as information on audit probabilities.

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[1] Chapters 1 and 2 discuss tax preparer usage in detail.

[2] The IMF does not provide information about what preparer type, i.e. H&R Block or a certified public accountant.

The tax policy literature reverberates with notions of a simpler and fairer tax system.[3] Legislators tout new policy as less complex after its adoption. However, researchers continue to estimate how much it costs each tax year to achieve compliance. When passed, the Tax Revenue Act of 1986 (TRA 86) was a major adjustment to the tax code to which American taxpayers were accustomed. The legislation passed since TRA 86 has not garnered the same level of academic study, which has resulted in sparse empirical research. The most recent empirical research, Ashley and Segal (1997), use 1988 data, with TRA 86 as their legal benchmark.

I examine a more recent piece of tax legislation, the Revenue Reconciliation Act of 1993 (RRA 93), Title XIII of the Omnibus Budget Reconciliation Act of 1993, to the same degree. From the standpoint of tax preparers, it was significant legislation. Thus, this leads to a probe of how tax law changes influence tax preparer use. The next section discusses some major tax code changes that occurred due to the passage of RRA 93. Following that is a review of previous studies in the area. An explanation of the model and variables comes next, followed by a brief description of the data. Last, I analyze the logit regression results from various specifications for a sample of taxpayers who file Form 1040 and a sample of taxpayers who are married filing Form 1040 jointly.

Revenue Reconciliation Act of 1993

RRA 93 brought forth several changes for individual taxpayers. Most notably the RRA 93 affected tax rates, earned income credit (EIC), Social Security, and moving expenses. The government also changed the rules with respect to various other portions of the tax code such as mortgages, charitable contributions, and capital gains distributions.

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[3] Chapter 1 discusses current tax policy issues.

Tax rates increased. For tax years 1993 and 1994, a new 36 percent tax bracket took effect.[4] It was applicable to individuals with taxable income in excess of $140,000 (if married filing jointly).[5] The law imposed a 10-percent surtax on taxable income in excess of $250,000.[6] The maximum tax rate imposed was 39.6 percent.

While individuals at higher incomes saw increases in their tax liability, other taxpayers experienced reductions. More lower income individuals were not required to file. The government also expanded the EIC to include taxpayers who did not have any children. These individuals could claim the credit on Form 1040EZ (as well as Form 1040 and 1040A). At the same time, RRA 93 dropped the health insurance credit and an extra credit for a child born during the year. Individuals who received the EIC in 1993 received a maximum of $2,364 while those who claimed the credit in 1994 received a maximum of $2,528. RRA 93 enabled EIC qualified taxpayers to receive the EIC in their paychecks.

Social Security and Medicare experienced extensive changes. Taxpayers receiving Social Security or tier 1 railroad retirement benefits had to include up to 85% of that amount in taxable income. Taxpayers must pay Social Security and Medicare taxes for household employees paid $1,000 or more to work in a taxpayer's home. Unlike previous tax years, all wages became subject to the Medicare tax of 1.45 percent.[7] Previously, the SS and Medicare thresholds were not permanent. This law made them permanent.

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[4] The 36 percent tax bracket's indexation for inflation began for tax years after December 31, 1994.

[5] For married filing separately, the threshold was $70,000. Singles with taxable income in excess of $115,000 fell into to the 36 percent bracket. Individuals filing as head of household with taxable income of $127,500 or greater felt the impact of the change.

[6] If a taxpayers filing status was married filing separately, taxable income over $125,000 was subject to the surtax.

The law revamped or discontinued taxpayer expenses previously allowed as deductions. The new treatment for moving expenses started in 1993. Certain items were no longer deductible such as the cost of selling, or settling the existing lease on, their former residence or the cost of buying or acquiring a lease on a new residence. Taxpayers were no longer able to deduct the cost of meals consumed while traveling to or living in temporary housing near the new workplace. The distance required for deducting moving expenses increased from 35 miles to 50 miles. In addition, the deduction now operated as an adjustment to gross income (a revision to pre-1986 tax treatment).

Some changes were tax code simplifications, which may increase the demand for tax preparation. This may seem counterintuitive but taxpayers may need information on the tax changes, which may increase the demand for tax preparation. Each required new or additional planning at the minimum for taxpayers. Some taxpayers may have sought the services of a preparer for alternatives. For example, deductible amounts of business and entertainment expenses decreased from 80 percent to 50 percent. Expenses related to any club or organization related to business, pleasure, recreation, or other social purposes were no longer deductible. The new law discontinued previously deductible travel expenses paid or incurred for a spouse, dependent, or other individual accompanying the taxpayer on business travel.

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[7] Self-employed individuals faced similar changes with respect to Social Security and Medicare. The maximum net earnings subject to the social security tax portion of the self-employment tax of 12.4% has increased to $60,600. All net earnings of at least $400 are subject to the Medicare tax portion of 2.9%.

RRA 93 also changed rules surrounding charitable deductions. This was important for 1040 filers. As of January 1, 1994, charitable contributions in excess of $250 needed verification from the charity. The donor had to receive the documentation before filing. It is the taxpayer's responsibility to retain the necessary documents, and the taxpayer cannot rely on a cancelled check as verification. In addition, if a contribution of more than $75 was made and part of the contribution was for a good or service, the organization must make you aware that only a portion, the remainder after deducting the value of the good or service received, of that contribution will be tax deductible.

The law made limits on personal exemptions and itemized deductions permanent. The exemption amount increased to $2,450 for each exemption, but the phase out for higher income individuals remained. The standard deduction increased as well. Some taxpayers who itemize may benefit from taking the standard deduction. The law also imposed some limits on the itemized deductions if the taxpayer's income exceeded $111,800 ($55,900 if married filing separately).

In addition, government officials reviewed and changed the alternative minimum tax (AMT). The AMT increased from 24 to 26 percent on income up to $175,000. The law imposed a 28% tax rate on income exceeding $175,000. Previously, the tax rate was 24%. The AMT exemption amounts also changed. It is $45,000 for joint returns, $33,750 for single and head of household taxpayers, and $22,500 for married but filing separate. A provision allowed individuals to give appreciated long-term capital gain property to charities without AMT consequences. It also eliminated tangible personal property contributions made after June 30, 1992 and other property contributions made after December 31, 1992 as preference items. The taxpayer can deduct the fair market value of the contribution.[8]

Tax Preparer Use Studies

Statistics suggest that many audited returns are those handled by tax preparers (Klepper and Nagin 1989). The empirical results of Klepper and Nagin (1989) are that professionally completed returns tend to be more compliant when it comes to unambiguous items. They used the Taxpayer Compliance Measurement Program (TCMP) audit data that the IRS provides. However, when Klepper and Nagin (1989) looked at ambiguity reduction, the empirical study results were contrary to the results found when looking at unambiguous items. The less compliant returns were those handled by preparers. It is not clear whether this is because the returns handled by tax preparers tend to be more complex. Alternatively, perhaps, this is due to deliberate attempts by tax preparers and taxpayers to deceive the IRS or simply aggressive tax reduction.

Christian, Gupta, and Lin (1993) state that tax preparer use depends upon several factors beyond the three categories ascribed by Cuccia (1994).[9] Some people seek advice because their time cost of return preparation is great. If individuals are unfamiliar with the forms they need to file, they may seek advice. A self-employed worker is also more likely to require a preparer. The income level or marginal tax rate also has an impact on tax preparer use. Regardless of the reason for using a tax preparer, taxpayers may be one of two types. They may be honest and simply trying to reduce uncertainty or intentionally trying to evade proper payment of their tax liability (Hite and McGill 1992).

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[8] More taxpayers have become liable for the AMT over time.

[9] Chapter 1 discusses Cuccia (1994).

Ashley and Segal (1997) use 1988 Individual Public-Use Microdata File (IMF) to investigate the characteristics of taxpayers. The paper's goal is similar to Christian, Gupta, and Lin (1993). The results of a logit estimation of the reduced form model for paid tax preparer use establish that income-related dollars per schedule, as measured by the absolute positive income,[10] are significant and positively correlated to the likelihood of using a paid tax preparer when filing schedule B or E.

In Ashley and Segal, results contrary to those of prior studies were observed for the significance of total positive income, marginal tax rate, measure of dependents, and schedule A. Total positive income as well as the marginal tax rate is not significant in the decision to use a tax preparer. Exemption has a negative relationship with preparer use. Schedule A also has a significant negative coefficient.

Data

I use the Individual Tax Model (ITM) files that are a part of the Ernst & Young/ University of Michigan Tax Research Database. The Statistics of Income Division of the IRS randomly selects, based on the ending digits of the individual's Social Security Number (SSN), unaudited Form 1040, 1040A, 1040EZ, and 1040PC tax returns.

Despite several limitations, testing theories with respect to tax code changes is feasible. In 1994, the dataset contains 96,384 observations with 215 pieces of information from each tax return. Most importantly, the file contains information about income levels, marital status, employment status, exemptions, deductions, and tax preparation.

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[10] The absolute positive income is a measure created by Ashley and Segal to further explain tax preparer use. It links tax preparer use to other expenses and deductions beyond total positive income.

I supplemented the data with audit information from the Transactional Records Access Clearinghouse (TRAC) at Syracuse University. The ITM dataset provides information on each taxpayer's state of residence (if their adjusted gross income is below $200,000), but it does not have information on IRS district. Using the taxpayer's state of residence, I infer aggregate audit probabilities for taxpayers from IRS district audit rates.[11]

There are 33 districts, but Table 4-1 does not show all 33 districts. I collapsed California, Florida, Texas, and New York into single districts for each state. California consists of the Central California, Los Angeles, Northern California, and Southern California districts. Florida has two districts, North and South Florida. Houston, North Texas, and South Texas districts make up Texas. New York consists of Brooklyn, Manhattan, and Upstate New York districts.

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[11] The method I use to construct the audit rate is in the section labeled "Model and Variable Definitions."

Table 4-1 IRS District Information

Region	District	Revenue Agents	Returns Audited	Returns Audited (%)	Audit Hours
Midstates	AR-OK	314	23,271	1.01	7
	Texas[(a)]	1,284	62,659	0.83	9
	IL	835	36,385	0.69	11
	KS-MO	514	26,022	0.77	8
	Midwest	471	20,686	0.48	10
	North Central	361	21,741	0.83	8
Northeast	CT-RI	386	16,512	0.82	9
	MI	405	21,943	0.54	8
	New England	624	23,638	0.57	11
	New Jersey	468	14,587	0.39	13
	New York[(b)]	1,566	42,900	0.55	10
	OH	640	17,171	0.34	9
	PA	615	23,718	0.44	10
Southeast	DE-MD	321	23,559	0.70	7
	Florida[(c)]	706	45,634	0.79	8
	GA	603	14,643	0.50	10
	Gulf Coast	400	32,773	1.11	5
	IN	418	39,943	0.90	6
	KY-TN	240	15,931	0.63	7
	NC-SC	371	24,364	0.87	8
	VA-WVA	297	21,418	0.60	8
Western	California[(d)]	2,258	148,910	1.12	8
	Pacific Northwest	442	33,738	0.73	8
	Rocky Mountain	488	29,529	0.87	9
	Southwest	310	36,549	1.23	5
Unweighted Average		465	24,842	0.75	8.53

Note: (a) Texas is the 3 IRS districts: Houston, North Texas, and South Texas.
(b) New York is the 3 IRS districts: Brooklyn, Manhattan, and Upstate New York.
(c) Florida is the 2 IRS districts: North Florida and South Florida.
(d) California is the 4 IRS districts: Central California, Los Angeles, Northern California, and Southern California.

While I collapsed some districts into one state to match ITM data availability, the IRS collapses multiple states into one district. Table 4-1 shows specific district information for 1994, as reported by the Transactional Records Access Clearinghouse. The Midwest district consists of Iowa, Nebraska, and Wisconsin. The North Central district consists of Minnesota, North Dakota, and South Dakota. The New England district consists of Maine, Massachusetts, New Hampshire, and Vermont. The Gulf Coast district consists of Alabama, Louisiana, and Mississippi. The Pacific-Northwest district consists of Alaska, Hawaii, Oregon, and Washington. The Rocky Mountain district consists of Colorado, Idaho, Montana, Utah, and Wyoming. The Southwest district consists of Arizona, Nevada, and New Mexico.[12]

Model and Variable Definitions

The demand for tax preparer services depend on several factors such as socioeconomic and demographic characteristics, risk aversion, employment status, complexity, time cost, tax knowledge, education, and social responsibility (Collins et al 1990; Christian, Gupta, and Lin 1993; Caudill and Long 1987). Though these variables capture the essence of the usage of a tax return preparer, information such as tax knowledge, education, and social responsibility are outside the scope of what is available on tax returns.[13] Tax returns provide researchers with proxies for other variables.

Tax preparer usage is identifiable on each return. Legally, a tax preparer must sign each return he or she prepares. Some measurement error may exist because a taxpayer could go to a preparer and file the return without the preparer signature. There is also the possibility that the taxpayer seeks advice in one year, but self-prepares the following years. The taxpayer reaps the benefit of having been to a preparer. It is not possible to directly measure the impact of such behavior on taxpayer reporting.

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[12] I will discuss the construction of the audit variable in the next section, but note, that I can only infer audit rates for the entire district.

[13] It is possible to merge aggregate education information based on state of residence from Census Population Studies, but this may not provide the type of variation necessary to gleam any results because the AUDIT variable utilizes state of residence in its construction.

In the model, the dependent variable, PREP, is a categorical variable, which is coded as one if the taxpayer received advice and zero otherwise.[14] I define proxies for the residual abstract variables below.

TPI: total positive income, the sum of all positive income line items on the return, divided by 10,000 and stated in 1994 dollars.

MTR: marginal tax rate on taxable income as defined by federal law.[15]

AGE65: categorical variable for age 65 and over.

MARRIED: categorical variable for married (filing joint or separate).

EXEMPT: total number of exemptions claimed for children living at home.

SEMPL: categorical variable for self-employed as defined by Schedule C, Schedule F, or Schedule SE.

FORMS: number of the forms attached to return.[16]

SCHS: total number of schedules attached to form, ranges in value from 0 to 4.

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[14] The public use data have several categories of advice. If a return is not self or professionally prepared, I did not use them. Previous studies have placed these additional returns with the preparer completed returns. Only 375 of the returns in the 1994 IMF are affected.

[15] The marginal tax rate uses income subject to tax as its determinant. Income subject to tax is identical to taxable income except for dependents paying "kiddie" tax from Form 8615 and returns with long-term capital gains taxed at the 28 percent rate.

[16] The forms are 1116, 2106, 2439, 2441, 2555, 3468, 3903, 4136, 4137, 4255, 4684, 4797, 4835, 4868, 4970, 4972, 5329, 5884, 6251, 6765, and Schedule R. Each form's tax relevance is listed in Appendix B. The results may be similar to Christian, Gupta, and Lin (1993) because they used the same forms with the exception of forms 5405, 5544, and 5695. Ashley and Segal (1997) use a more extensive list of forms.

SCHA: categorical variable for Schedule A (itemized deductions).

SCHB: categorical variable for Schedule B (interest or dividends greater than $400).

SCHD: categorical variable for Schedule D (net capital gain less loss).

SCHE: categorical variable for Schedule E (rent, royalty, or partnerships).

AMT: categorical variable for the alternative minimum tax

RT1040: categorical for tax return form 1040.

RT1040EZ: categorical for tax return form 1040EZ.

COST: time-cost in hours multiplied by an after-tax wage rate.[17]

AUDIT: aggregate audit information based on IRS districts.

EIC: categorical variable for earned income credit eligibility as indicated by tax return.

CCC: categorical variable for childcare credit as indicated by tax return

The variable TPI measures the influence of income on preparer use (Christian, Gupta, and Lin 1993) and acts as a alternative measure for the opportunity cost of preparing one's own return (Long and Caudill 1987). Using these definitions, it likely has a positive impact on preparer usage. Assuming risk aversion is a decreasing function of income and TPI is a proxy for risk aversion, the variable may have a negative value. Therefore, TPI is difficult to interpret.

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[17] The after-tax wage rate is [(TPI*10,000)/2000]*(1 – MTR), which is the after-tax income scaled by the typical number of hours worked in a year. This technique is used in Christian, Gupta, and Lin (1993). I do not use COST in the estimation in Chapter 4. It is only a summary statistic. It is in the logit regression in Chapter 5 when I compare my results to those of Christian, Gupta, and Lin.

The variable MTR should have a positive impact. It is a measure of the value of the tax preparer's service. If preparers reduce tax liability, then the service becomes more valuable as the MTR increases. The definition of MTR follows the definition defined by Christian, Gupta, and Lin (1993). It measures the tax savings associated with the "first dollar" of itemized or standard deductions, adjustments to income, or tax losses. However, the inclusion of TPI and MTR can lead to some complications (Ashley and Segal 1997). Ashley and Segal found that both variables are insignificant when both are included in the model estimation. Long (1999) explains using ITM 1991 why TPI and MTR may have this odd association. An increase in the marginal tax rate reduces taxable income because taxpayers claim larger deductions. In addition, higher income taxpayers are more responsive to marginal tax rate increases. The ITM panel contains a large number of high-income taxpayers, and thus, the problem appears magnified.[18]

The demographic proxies are AGE65, MARRIED, and EXEMPT. As an individual grows older, the need for a tax preparer may decrease or increase. The need may decrease if these individuals have less income and deduction. The need may increase if a taxpayer's retirement income requires assistance. In addition, fewer exemptions could increase the use of a preparer, as tax liability rises unless investments to reduce liability are made.

Married individuals who file jointly may have more income but may have simpler tax returns. Two salary earners may have simple tax lives but a high total income. This would suggest decreased use of a preparer. However, in 1994, married filers received a standard deduction of $6,350 while two single filers could receive $7,600 total. Married filers also face a different tax rate schedule than other filers.[19] Perhaps, this is an inducement to have a preparer complete their return and find deductions.

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[18] I drop certain high-income taxpayers from my sample. Results suggest that TPI and MTR insignificance problems in previous studies dissipate.

SEMPL is included to investigate the impact of employment status on tax preparation. Self-employed individuals tend to have complicated returns. Being self-employed may mean that you have an accountant for your business and having the accountant complete your individual tax return is efficient.

FORMS and SCHS, are measures of complexity. Each form and schedule requires some ability to complete. They should have a positive relationship with preparer use. While schedules B, D, and E are included to illustrate different sources of income, I exclude schedules C and F as variables because I used them to construct the self-employment variable.

I have three variables AMT, EIC, and CCC, which are new measures of complexity. The AMT does not appear in previous studies. It was typically included in the list of forms. I have extracted it from the list as a separate measure of complexity. In recent years, with the growth of the economy and dot.com millionaires, the alternative minimum tax has come under fire, whether it is as frustrating and misdirected as some claim is important.

As noted above, in 1993, tax law changes expanded the earned income credit. It should have a positive relationship with preparer use due to its link to complexity. However, income restrictions on those eligible for the EIC means that mostly low-income taxpayers are eligible. These taxpayers are probably using Form 1040EZ.

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[19] This is one cause of the marriage tax/subsidy. Fox (2001) states that some couples pay higher taxes while others receive a bonus from the current tax policy.

Similarly, previous research does not examine the childcare credit. Again, taxpayers must complete a worksheet to determine eligibility for the childcare credit. This suggests some complexity. This complexity might increase the taxpayer's chances of using a preparer. However, it has the same income restrictions as the EIC, which implies the possibility of a negative relationship.

I include the variable AUDIT to allow audit probability rates to receive a proper treatment (Erard 1990; Dubin, Graetz, Udell, and Wilde 1992). Referring to Table 4-1, the audit probability rates included are district level aggregates. Audit probability rates and preparer usage should have a positive relationship.[20] This measure acts a proxy for a taxpayer's belief that the IRS will audit his or her tax return. Since audits can be laborious for the taxpayer, one would expect that taxpayers try to avoid audits by seeking professional assistance. The preparer, being knowledgeable about the tax code, should do a better job completing the return.[21] In addition, if there were a problem with the return in some circumstances, the preparer would meet with the Internal Revenue Service.

California, Florida, New York, and Texas are states with multiple IRS districts. This complication makes it difficult to calculate the taxpayer's expected audit rate since I cannot identify which districts a taxpayer resides in. For these four states, the audit rate is an average, using population weights (derived from Census Bureau data), for all districts within that state. I have also included some other information about the 33 IRS districts in Table 4-1.

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[20] In Chapter 2, Table 2-1 indicates that as preparer use increased, IRS audit activity decreased. It is understandable to find that time series data conflicts with results obtained from cross-sectional data. In addition, district audit rates decreased over time, but the additional tax revenue from auditing did not decrease.

For example, California has four districts. The Central California district had 3,984,942 residents or 19 percent of the population age 16 and older in 1994. The audit probability associated with this district was 0.74. The Los Angeles district contained 29 percent of the population with 6,141,724 residents and had an audit probability of 1.32.[22]

The Northern California and Southern California districts both had 26 percent of the population, 5,670,233 and 5,628,080 residents respectively, and an audit rate of 1.15. This information assists me in finding the average audit rate (AR) as shown below:

$$(1) \qquad AR_{CA} = \frac{(3{,}984{,}942 \times 0.74) + (6{,}141{,}724 \times 1.32) + (5{,}670{,}233 \times 1.15) + (5{,}628{,}080 \times 1.15)}{3{,}984{,}942 + 6{,}141{,}724 + 5{,}670{,}233 + 5{,}628{,}080} = 1.12$$

Sample Selection

To clearly identify preparer use, income taxability, audit rates, and complexity, I dropped a number of observations as shown in Table 4-2. Taxpayers in the final sample either identified themselves as someone who self-prepared their return or received professional assistance.

The analysis required removing taxpayers who identified themselves as high-income nontaxable (HINT) or large business taxpayers. Since the goal is to characterize

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[21] In the previous chapter, the tax preparer was not perfect. He or she could make a mistake.

[22] The Los Angeles district is Los Angeles County except for the portion served by the Southern California district. This includes 1995 US Postal Services Zip Codes 90254, 90274, 90277, 90278, 90501, 90502, 90503, 90505, 90506, 90507, 90508, 90509, 90510, 90701, 90702, 90703, 90704, 90706, 90707, 90710, 90711, 90712, 90713, 90714, 90715, 90716, 90717, 90731, 90732, 90733, 90734, 90744, 90745, 90746, 90747, 90748, 90749, 90801, 90802, 90803, 90804, 90805, 90806, 90808, 90809, 90810, 90813, 90814, 90815, 90822, 90831, 90832, 90833, 90834, 90835, 90840, 90844, 90846, 90853.

Table 4-2 Sample Revision

Information Removed	Number of Observations Dropped
Individuals with AGI > $200,000	37,294
Individuals living in US territories or possessions	403
Individuals who did not self-preparer or get a professionally prepared return	375
Returns filed for years other than calendar year 1994	1,552
Individuals who used Form 1040PC	1,632
Individuals who filed electronically	3,996
Individuals who did not use the standard or itemized deduction	1,986
Taxpayers classified as high income nontaxable	17,320
Taxpayers who did not use Form 1040	19,612

individuals who paid personal income taxes, I do not include these observations. Furthermore, state of residence is not available for these taxpayers.

The remaining changes ensure proper calculation of the audit rate. Taxpayer records with adjusted gross income greater than $200,000 lack information on their state of residency. Since calculating the audit variable requires knowing the state of residence, these taxpayers are not used. Similarly, I removed taxpayers who live in United States territories or possessions because TRAC does not provide audit information.

If complexity is at the center of the tax policy debate, taxpayers filing 1040 returns are crucial. These individuals use various forms and schedules. In addition, the growing debate about the "marriage tax" calls for a review of married filers tax preparer usage.

Of the remaining 12, 214 observations, the descriptive statistics for all variables are in Table 4-3. As the table shows, about 65 percent of 1040 filers used a preparer.

Table 4-3 Variable Descriptive Statistics for Taxpayers who itemized in the 1994 Individual Taxpayer Model File (N = 12,214)

Variable (a)	Mean	Standard Deviation
PREP	0.645	0.478
TPI (b)	7.189	4.592
MTR (c)	22.543	8.801
SEMPL	0.055	0.228
MARRIED	0.717	0.450
EXEMPT	0.798	1.098
AGE65	0.153	0.360
FORM	0.625	0.768
SCHS	2.320	1.089
SCHB	0.591	0.492
SCHD	0.347	0.476
SCHE	0.382	0.486
AUDIT (d)	0.725	0.252
AMT	0.117	0.321
CCC	0.069	0.253
EIC	0.022	0.197

Note: (a) The text contains variable descriptions.
(b) To obtain TPI, you need to multiply by 10,000.
(c) The MTR is a percentage rate.
(d) AUDIT is a percentage rate.

Mean total positive income is just under $72,000. The marginal tax rate is just over 22 percent with the self-employed population being only 5.5 percent. With respect to demographics, 15 percent of all taxpayers claimed the additional exemption for being age 65 or older. Almost 72 percent of the Form 1040 taxpayers are married. Each taxpayer has approximately one exemption for a child living at home. Most taxpayers used at least one additional form. In 1994, 2 percent of these taxpayers were eligible for the earned income credit. Only 7 percent of taxpayers elected to take the child care credit. The childcare credit usage is low relative to the fraction of households with young children. If a taxpayer received dependent care benefits from their employer or some other agency, she may be unable to claim the childcare credit. Approximately 12 percent of the sample population was subject to the alternative minimum tax rate.

Results

The results of the logit regression analysis are in the tables below. In most tables, there are three specifications. Specification 1 examines the effect of income, marginal tax rate, taxpayer demographics, and employment status on preparer usage. Specification 2 adds the tax complexity variables (FORMS and SCHS). Specification 3 replaces the variable SCHS by a vector of categorical variables (SCHB, SCHD, and SCHE) indicating the presence of a particular schedule.

Table 4-4, 4-5, and 4-6 Logit Regression Results

Table 4-4 presents the 1994 data estimates of the three specifications.[23] This table corresponds somewhat Christian, Gupta, and Lin's (1993) Table 2 where they focus on itemizers.[24] It is also similar to Ashley and Segal's (1997) Table 3. Their estimates for

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[23] Appendix C contains the marginal effect values for all tables presenting logit regression results.

[24] In particular, Christian, Gupta, and Lin (1993) perform a logit regression on a 1983 cross section of itemized returns in Panel A. However, I do not use Schedules G and W in my estimation. Schedule G was for income averaging and Schedule W was for a two-wage earner deduction.

TPI and MTR do not correspond to the estimates I find.[25] Tables 4-5 and 4-6 exclude TPI or MTR.

Table 4-4 Logit Regression Results of Tax Preparer Usage for Itemized Returns (Two-Tailed p-Values of Asymptotic t-Statistics in parentheses)

Variable	1	2	3
TPI	0.0935	0.0226	0.0256
	(0.000)	(0.003)	(0.001)
MTR	-0.0391	-0.0263	-0.0246
	(0.000)	(0.000)	(0.000)
MARRIED	-0.2660	-0.2104	-0.2214
	(0.000)	(0.000)	(0.000)
EXEMPT	-0.1302	-0.1165	-0.1253
	(0.000)	(0.000)	(0.000)
AGE65	1.0039	0.7106	0.7910
	(0.000)	(0.000)	(0.000)
SEMPL	1.3433	1.0156	0.8806
	(0.000)	(0.000)	(0.000)
FORMS		0.5661	0.5501
		(0.000)	(0.000)
SCHS		0.4993	
		(0.000)	
SCHB			0.2685
			(0.000)
SCHD			0.3576
			(0.000)
SCHE			0.9077
			(0.000)
CONSTANT	0.9447	-0.2677	-0.2328
	(0.000)	(0.001)	(0.002)
Log-Likelihood	-7530.7783	-7052.5419	-7004.8365
N	12214		

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[25] Ashley and Segal (1997) use Schedule A in their model estimation for 1040 Taxpayers. This could account for some of the differences. An alternative explanation is that tax policy changes that were relevant in 1994 considerably influenced preparer use. I will discuss this in a later section.

In the full specification estimate, TPI is significant and positive while MTR is significant and negative. In Table 4-4, column one, the p-value, probability that the variable is equal to zero, associated with TPI is 0.000. This means that the $p < 0.0005$ or $p < 0.001$ which indicates that income has an impact on tax preparer use by taxpayers. Yet, these same taxpayers have a substantial number of deductions and special tax items, which leads MTR to have a negative impact on preparer use. This further increases the complexity of such returns.

Table 4-5 Logit Regression Results of Tax Preparer Usage for Itemized Returns excluding MTR (Two-Tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	1	2	3
TPI	0.0366	-0.0171	-0.0115
	(0.000)	(0.001)	(0.030)
MARRIED	-0.2029	-0.1679	-0.1817
	(0.000)	(0.001)	(0.000)
EXEMPT	-0.0964	-0.0916	-0.1025
	(0.000)	(0.000)	(0.000)
AGE65	1.1006	0.7644	0.8466
	(0.000)	(0.000)	(0.000)
SEMPL	1.4089	1.0485	0.9069
	(0.000)	(0.000)	(0.000)
FORMS		0.5695	0.5527
		(0.000)	(0.000)
SCHS		0.5221	
		(0.000)	
SCHB			0.2713
			(0.000)
SCHD			0.3888
			(0.000)
SCHE			0.9419
			(0.000)
CONSTANT	0.3703	-0.6966	-0.1438
	(0.000)	(0.000)	(0.004)
Log-Likelihood	-7600.5460	-7080.2355	-7028.7794
N	12214		

Unlike other regression methods, logit regression estimates indicate direction but do not indicate magnitude directly. It is possible to calculate the marginal effects.[26] Overall, the explanatory value of income and the marginal tax rate is low. An income increase of $10,000 changes preparer use by 0.2 percent to 2 percent. Note that the coefficient estimate for income is negative at times. Thus, income increases preparer use at times while causing a decrease in preparer use at other times.

The marginal tax rate is consistently negative and typically leads to a small reduction in the probability of preparer use. As the marginal tax rate increases by 1 percentage point, tax preparer use decreases by 0.1 percent to 0.4 percent.

As in Christian, Gupta, and Lin (1993), marital status and exemptions have a negative relationship with preparer use. Married individuals are less likely to use a preparer. In addition, preparer use decreases with an increase in the number of exemptions. While some exemptions are difficult to account for, tax exemptions for children are not difficult to calculate. Older individuals and self-employed taxpayers are more likely to use a preparer.

Both MARRIED and EXEMPT are consistent. Married reduces preparer use by approximately 4 percent because the estimate is negative in tables 4-4 through 4-6. If exemptions increase by one, preparer use decreases by 2 to 3 percent.

Age and self-employment have a substantial positive impact on preparer use. For taxpayers who are age 65 or older, preparer use increases by 16 to 22 percent. Self-

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[26] According to Christian, Gupta, and Lin (1993), the formula for the marginal effect for the kth explanatory variable is $[p(1-p)]\beta_k$, where p is the proportion of tax preparer returns in the sample and β_k is the variable mean. In this case, STATA calculated the marginal effects at the explanatory variable means in Table 4-3 and with a constant equal to one.

Table 4-6 Logit Regression Results of Tax Preparer Usage for Itemized Returns excluding TPI (Two-Tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	1	2	3
MTR	-0.0065	-0.0188	-0.0162
	(0.004)	(0.000)	(0.000)
MARRIED	-0.0853	-0.1697	-0.1751
	(0.067)	(0.001)	(0.000)
EXEMPT	-0.0936	-0.1069	-0.1145
	(0.000)	(0.000)	(0.000)
AGE65	1.0661	0.7109	0.7904
	(0.000)	(0.000)	(0.000)
SEMPL	1.5123	1.0390	0.9084
	(0.000)	(0.000)	(0.000)
FORMS		0.5740	0.5592
		(0.000)	(0.000)
SCHS		0.5204	
		(0.000)	
SCHB			0.2925
			(0.000)
SCHD			0.3874
			(0.000)
SCHE			0.9257
			(0.000)
CONSTANT	0.6904	-0.3689	0.1433
	(0.000)	(0.000)	(0.040)
Log-Likelihood	-7627.4181	-7056.9770	-7010.4417
N	12214		

employed individuals increase preparer use by 19 to 30 percent. Specifications 2 and 3, which account for complexity, show that income, tax rates, and the demographic variables continue to have the same relationship with preparer use. Forms and schedules have positive relationships with preparer use. Taxpayers who need to complete various forms and schedules are more likely to use a preparer.

In Table 4-6, the exclusion of TPI causes income to switch sign when one accounts for complexity in specifications 2 and 3 but has no impact on the demographic or complexity variables. Specification 3 corresponds to Ashley and Segal (1997) specification 1 in their Table A2 where income takes a negative value.

In Table 4-6, the exclusion of income does not affect the estimate of MTR. It continues to be negative. This demonstrates that the tax rate even in the absence of income decreases the use of tax preparers for 1040 taxpayers. The demographic and complexity variables also do not change sign.

In Tables 4-5 and 4-6, for specifications 2 and 3 with forms and schedules, estimate values change and thus change the marginal effects. This explains the range of values above. The lower bound on the ranges for specifications 2 or 3, while the upper bound is for specification 1. The taxpayers need to have forms completed increases preparer use by 12 percent.

While the grouped schedule variable increases preparer use by about 11 percent, the individual schedule measures are more attractive. Schedule B increases preparer use by 6 percent. Schedule D increases preparer use by approximately 8 percent. Schedule E increases preparer use by the largest amount, approximately 20 percent.

Table 4-7 Logit Regression Results

Table 4-7 includes the district audit probability in the regression estimate.[27] Results inconsistent with Ashley and Segal (1997) suggest that some omitted explanatory variables exist. Specification 1 reveals results similar to previous estimates. Income and

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[27] Using the information gathered from TRAC, exemption is a predictor of audit rates. I ran the model without exemption and found that audit does not gain significance from its absence in the model.

Table 4-7 Logit Regression Results of Tax Preparer Usage with Audit Variable for Itemized Returns Non-Clustered (Two-Tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	1	2	3
TPI	0.0915	0.0215	0.0246
	(0.000)	(0.005)	(0.001)
MTR	-0.0378	-0.0254	-0.0239
	(0.000)	(0.000)	(0.000)
MARRIED	-0.2548	-0.2024	-0.2145
	(0.000)	(0.000)	(0.000)
EXEMPT	-0.1306	-0.1165	-0.1251
	(0.000)	(0.000)	(0.000)
AGE65	0.9942	0.7055	0.7855
	(0.000)	(0.000)	(0.000)
SEMPL	1.3463	1.0172	0.8839
	(0.000)	(0.000)	(0.000)
FORMS		0.5583	0.5434
		(0.000)	(0.000)
SCHS		0.4974	
		(0.000)	
SCHB			0.2743
			(0.000)
SCHD			0.3535
			(0.000)
SCHE			0.8997
			(0.000)
AUDIT	0.4860	0.3359	0.3015
	(0.000)	(0.000)	(0.000)
CONSTANT	0.5726	-0.5187	0.0055
	(0.000)	(0.000)	(0.955)
Log-Likelihood	-7511.5110	-7044.1099	-6998.1256
N		12214	

tax rate have opposite signs, with income having a positive impact on tax preparer use while the marginal tax rate has a negative impact on preparer use.[28] Individuals who are married with many exemptions are less like to use a preparer while older individuals and self-employed taxpayers are more likely to use a preparer. The audit rate has positive impact on preparer use in all three specifications.

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[28] Despite the negative coefficient on MTR, I will use TPI and MTR as the preferred specification to ask some other questions.

Specifications 2 and 3, which add forms and schedules, prove consistent for all estimates except income. Income takes on a negative value. By adding some form of complexity to the estimation, taxpayer income decreases the likelihood of using a preparer.

Table 4-8 Moulton Correction for Audit Variable

	Clustered			Non-clustered		
	1	2	3	1	2	3
Coefficient	0.4860	0.3359	0.3015	0.4860	0.3359	0.3015
Standard Error	0.2426	0.2359	0.2254	0.0786	0.0820	0.0824
t-ratio	2.004	1.424	1.337	6.182	4.098	3.658
p-value	0.045	0.154	0.181	0.000	0.000	0.000

Using conventional standard errors, audit probabilities have considerable statistical significance ($\rho < 0.01$ in all three specifications). Using Moulton's (1990) corrected standard errors reduces statistical significance in specifications 2 and 3. Table 4-8 summarizes these effects for the AUDIT coefficients from Table 4-7. The t-ratios continue to exceed one, but $\rho > 0.05$ in specification 2 and 3. However, STATA's clustered standard errors are approximations in several ways. First, it incorporates Moulton's formula, which assumes that the number of observations from each modified district is the same. In Table 4-9, the average number of observations per district is 489, and ranges from 181 to 1838. Second, Moulton bases his formula on OLS standard errors and not standard errors for general maximum likelihood estimates. Small adjustments in the Moulton corrections would restore significance at conventional levels, and increase significance further in the first specification.

Table 4-9 Modified District Observations

Region	District	Observations
Midstates	AR-OK	181
	Texas	474
	IL	587
	KS-MO	286
	Midwest	388
	North Central	312
Northeast	CT-RI	302
	MI	476
	New England	479
	New Jersey	618
	New York	1164
	OH	476
	PA	528
Southeast	DE-MD	438
	Florida	584
	GA	303
	Gulf Coast	290
	IN	201
	KY-TN	301
	NC-SC	408
	VA-WVA	429
Western	California	1838
	Pacific Northwest	485
	Rocky Mountain	364
	Southwest	302
Average		489

Table 4-10 and 4-11 Logit Regression Results

Tables 4-10 and 4-11 examine only specification 3. This specification corresponds most closely to previous research. It expands our knowledge of the tax preparer use studies by including new law variables for the alternative minimum tax, childcare credit, and the earned income tax credit in Table 4-10.

Table 4-10 Logit Regression Results of Tax Preparer Usage with Law Variables for Itemized Returns (Two-tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	3	3	3
TPI	0.0158	-0.0168	
	(0.044)	(0.002)	
MTR	-0.0216		-0.0164
	(0.000)		(0.000)
MARRIED	-0.1803	-0.1411	-0.1513
	(0.000)	(0.005)	(0.002)
EXEMPT	-0.1065	-0.0879	-0.0995
	(0.000)	(0.000)	(0.000)
AGE65	0.7778	0.8262	0.7768
	(0.000)	(0.000)	(0.000)
SEMPL	0.7853	0.8035	0.8005
	(0.000)	(0.000)	(0.000)
FORMS	0.4927	0.4946	0.4961
	(0.000)	(0.000)	(0.000)
SCHB	0.2249	0.2269	0.2386
	(0.000)	(0.000)	(0.000)
SCHD	0.3340	0.3593	0.3512
	(0.000)	(0.000)	(0.000)
SCHE	0.8562	0.8845	0.8663
	(0.000)	(0.000)	(0.000)
AMT	1.0581	1.0810	1.0778
	(0.000)	(0.000)	(0.000)
CCC	-0.4431	-0.4590	-0.4489
	(0.000)	(0.000)	(0.000)
EIC	0.2401	0.3079	0.2371
	(0.022)	(0.003)	(0.024)
CONSTANT	0.2320	-0.0995	0.1786
	(0.003)	(0.056)	(0.013)
Log-Likelihood	-6929.2319	-6946.8541	-6931.2719
N	12214		

Table 4-11 Logit Regression Results of Tax Preparer Usage with Audit and Law Variables for Itemized Returns Non-Clustered (Two-tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	3	3	3
TPI	0.0146	-0.0166	
	(0.063)	(0.002)	
MTR	-0.0207		-0.0159
	(0.000)		(0.000)
MARRIED	-0.1718	-0.1339	-0.1449
	(0.001)	(0.009)	(0.003)
EXEMPT	-0.1063	-0.0886	-0.0998
	(0.000)	(0.000)	(0.000)
AGE65	0.7712	0.8172	0.7704
	(0.000)	(0.000)	(0.000)
SEMPL	0.7857	0.8028	0.7996
	(0.000)	(0.000)	(0.000)
FORMS	0.4834	0.4843	0.4863
	(0.000)	(0.000)	(0.000)
SCHB	0.2308	0.2333	0.2435
	(0.000)	(0.000)	(0.000)
SCHD	0.3290	0.3527	0.3448
	(0.000)	(0.000)	(0.000)
SCHE	0.8461	0.8722	0.8552
	(0.000)	(0.000)	(0.000)
AUDIT	0.3377	0.3660	0.3436
	(0.000)	(0.000)	(0.000)
AMT	1.0723	1.0956	1.0909
	(0.000)	(0.000)	(0.000)
CCC	-0.4438	-0.4588	-0.4491
	(0.000)	(0.000)	(0.000)
EIC	0.2432	0.3082	0.2405
	(0.001)	(0.003)	(0.022)
CONSTANT	-0.0222	-0.3600	-0.0758
	(0.822)	(0.000)	(0.423)
Log-Likelihood	-6920.8903	-6936.988	-6922.6228
N	12214		

Table 4-11 adds the audit variable to the estimation. In addition, I estimated the specification with the exclusion of income and then the marginal tax rate.

Again, income changes sign with the exclusion of the tax rate for specification 3. The marginal tax rate continues to be negative. The demographic variables do not show any changes. While older or self-employed taxpayers are more likely to use a preparer. Individuals who are married and have exemptions are less likely to use a preparer. In addition, the schedules continue to have a positive impact on preparer use.

The law variables appear to be strong indicators of preparer use. The AMT and the EIC increase the use of tax preparers. However, the childcare credit has a negative impact on preparer use. This suggests that the complexity associated with the AMT and EIC is greater than the complexity associated with the childcare credit.[29]

Table 4-12 Moulton Correction for Audit Variable

	Clustered			Non-clustered		
	3	3	3	3	3	3
Coefficient	0.3377	0.3660	0.3436	0.3377	0.3660	0.3436
Standard Error	0.2202	0.2292	0.2229	0.0828	0.0826	0.0828
t-ratio	1.534	1.597	1.541	4.077	4.433	4.151
p-value	0.125	0.110	0.123	0.000	0.000	0.000

The addition of the audit variable in the last three columns does not have a significant impact on any parameter estimate.[30] The combination of audit with the law variables causes audit to be insignificant at the $\rho < 0.05$ level when using the Moulton corrected standard errors. Table 4-12 displays the results for the audit probability variable. However, as the audit rate increases, preparer use increases.

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[29] An alternative rationale is that the tax policy changes associated with the childcare credit in 1994 were not as drastic as those associated with the AMT or EIC. While the AMT rate changed and the EIC was eligible to single individuals without a qualifying dependent, the childcare credit did not undergo such a change.

[30] Income is significant at the $\rho < 0.10$ levels.

Tables 4-10 and 4-11 use only specification 3. The law variables, which are always significant at the $\rho < 0.05$ level, do explain some preparer use. The childcare credit reduces preparer use by approximately 10 percent. The earned income tax credit increases the probability of preparer use by 5 percent. The alternative minimum tax weighs in heavily for 1040 taxpayers increasing the probability of preparer use by 23 percent.

Table 4-13 and 4-14 Logit Regression Results

The last tables look at a subset of the 1040 taxpayer population in 1994. When I restrict the data to taxpayers who are married filing jointly, the coefficient on TPI is always positive and the coefficient on MTR is always negative regardless of whether audit is in the estimation. Most explanatory variables hold their values across the various specifications. Income is not significant at the $\rho < 0.05$ level in Specifications 2 and 3. When audit enters the estimation, it also is not significant at the $\rho < 0.05$ level except in specification 1.

Tables 4-13 and 4-14 indicate that in specification 1 increasing TPI by $10,000 increases the probability of preparer use by 2 percent. Specifications 2 and 3 show an approximately 0.4 to 0.5 percent increase.[31] Increasing the marginal tax rate by 1 percent decreases the probability of preparer use by 0.5 to 1 percent. One additional exemption will decrease the probability of preparer use by 2 to 3 percent.

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[31] TPI is not significant at the $\rho < 0.01$ level in Models 2 and 3. However, model 3 run without MTR shows that TPI is significant and changes sign. This shows the correlation between TPI and MTR is significant.

Table 4-13 Logit Regression Results of Tax Preparer Usage for Itemizers who are Married Filing Jointly (Two-tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	1	2	3
TPI	0.0899	0.0176	0.0213
	(0.000)	(0.057)	(0.023)
MTR	-0.0420	-0.0285	-0.0261
	(0.000)	(0.000)	(0.000)
EXEMPT	-0.1363	-0.1213	-0.1344
	(0.000)	(0.000)	(0.000)
AGE65	0.8901	0.6014	0.6777
	(0.000)	(0.000)	(0.000)
SEMPL	1.3045	0.9750	0.8142
	(0.000)	(0.000)	(0.000)
FORMS		0.5879	0.5740
		(0.000)	(0.000)
SCHS		0.5140	
		(0.000)	
SCHB			0.2733
			(0.000)
SCHD			0.2985
			(0.000)
SCHE			0.9876
			(0.000)
CONSTANT	0.7777	-0.4309	0.0622
	(0.000)	(0.000)	(0.482)
Log-Likelihood	-5302.0736	-4925.9584	-4880.7138
N	8449		

In Tables 4-13 and 4-14 (and later Tables 4-17 and 4-18), following the results for 1040 taxpayers in general, being age 65 or older increases the probability of preparer use by 20 percent in specification 1, 13 percent in specification 2, and 16 percent in specification 3. Self-employed individuals observe a high probability of tax preparer use. In specification 1, it is 30 percent. Specification 2 sees a slight reduction from specification 1 to 22 percent. Specification 3 states that self-employment increases the probability by 19 percent. Some of the estimates follow the same pattern as the entire

1040 population. Forms, schedules, and individual schedules increase the probability of preparer use in the same manner.

Table 4-14 Logit Regression Results of Tax Preparer Usage for Itemizers who are Married Filing Jointly with Audit Variable Non-Clustered (Two-tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	1	2	3
TPI	0.0887	0.0171	0.0209
	(0.000)	(0.064)	(0.026)
MTR	-0.0407	-0.0277	-0.0254
	(0.000)	(0.000)	(0.000)
EXEMPT	-0.1359	-0.1209	-0.1337
	(0.000)	(0.000)	(0.000)
AGE65	0.8804	0.5962	0.6721
	(0.000)	(0.000)	(0.000)
SEMPL	1.3082	0.9763	0.8172
	(0.000)	(0.000)	(0.000)
FORMS		0.5797	0.5670
		(0.000)	(0.000)
SCHS		0.5122	
		(0.000)	
SCHB			0.2804
			(0.000)
SCHD			0.2931
			(0.000)
SCHE			0.9800
			(0.000)
AUDIT	0.5087	0.3493	0.3134
	(0.000)	(0.000)	(0.002)
CONSTANT	0.3923	-0.6889	-0.1715
	(0.044)	(0.000)	(0.139)
Log-Likelihood	-5287.5882	-4919.7790	-4875.8165
N		8449	

Table 4-15 Moulton Correction for Audit Variable

	Clustered			Non-clustered		
	1	2	3	1	2	3
Coefficient	0.5087	0.3493	0.3134	0.5087	0.3493	0.3134
Standard Error	0.2553	0.2545	0.2458	0.0949	0.0995	0.1003
t-ratio	1.993	1.372	1.275	5.360	3.509	3.125
p-value	0.046	0.170	0.202	0.000	0.000	0.002

In Table 4-14 (and later in Table 4-17), if the audit rate increases by 0.1, the probabilities of preparer use by 12, 8, and 7 percent respectively for specifications 1 through 3. This too is consistent with the whole 1040 sample population. Notice that again it is not significant at the $\rho < 0.05$ level in specifications 2 and 3 when clustered.

Tables 4-16 and 4-17 Logit Regression Results

Tables 4-16 and 4-17 correspond to Table 4-14 by adding the law variables and audit for married taxpayers filing jointly. However, the estimation is for all three specifications. There are some noteworthy differences. Income is not significant at the $\rho < 0.05$ level in specifications 2 and 3. CCC has a positive influence in tax preparer use in specification 1 and is not significant at the $\rho < 0.05$ level. The earned income tax credit is significant at the $\rho < 0.05$ level but continues to have a positive impact on tax preparer use. In Table 4-18, we notice that audit is again not significant at the $\rho < 0.05$ level in specifications 2 and 3 when coupled with the tax law variables if clustered.

The law variables show slight changes from the entire 1040 population. Although there is no comparable measure of the childcare credit in previous tables, notice that it is positive and insignificant at the $\rho < 0.05$ levels in specification 1. CCC increases the

Table 4-16 Logit Regression Results of Tax Preparer Usage for Itemizers who are Married Filing Jointly with Law Variables (Two-tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	1	2	3	3	3
TPI	0.0614	0.0077	0.0113	-0.0207	
	(0.000)	(0.415)	(0.235)	(0.001)	
MTR	-0.0356	-0.0242	-0.0219		-0.0177
	(0.000)	(0.000)	(0.000)		(0.000)
EXEMPT	-0.1466	-0.1042	-0.1171	-0.1037	-0.1132
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
AGE65	0.8371	0.5891	0.6621	0.6909	0.6581
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SEMPL	1.0919	0.8815	0.7233	0.7409	0.7333
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FORMS		0.5636	0.5528	0.5553	0.5551
		(0.000)	(0.000)	(0.000)	(0.000)
SCHS		0.4703			
		(0.000)			
SCHB			0.2331	0.2317	0.2423
			(0.000)	(0.000)	(0.000)
SCHD			0.2694	0.2923	0.2816
			(0.000)	(0.000)	(0.000)
SCHE			0.9316	0.9589	0.9384
			(0.000)	(0.000)	(0.000)
AMT	1.8806	0.9583	0.9343	0.9528	0.9461
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CCC	0.0344	-0.4998	-0.4946	-0.5157	-0.5002
	(0.678)	(0.000)	(0.000)	(0.000)	(0.000)
EIC	0.3479	0.3422	0.3367	0.4144	0.3348
	(0.018)	(0.022)	(0.025)	(0.006)	(0.026)
CONSTANT	0.7303	-0.3763	0.0736	-0.2172	0.0487
	(0.000)	(0.000)	(0.415)	(0.001)	(0.579)
Log-Likelihood	-5121.7403	-4869.2387	-4826.9690	-4837.5774	-4827.6761
N	8449				

probability of preparer use by approximately 0.1 percent in tables 4-16 and 4-17. In specifications 2 and 3, CCC is negative and significant. It decreases preparer use by about 11 percent. EIC is significant at the $\rho < 0.05$ level and increases the probability

Table 4-17 Logit Regression Results of Tax Preparer Usage for Itemizers who are Married Filing Jointly with Audit and Law Variables Non-Clustered (Two-tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	1	2	3
TPI	0.0601	0.0070	0.0108
	(0.000)	(0.455)	(0.258)
MTR	-0.0341	-0.0232	-0.0211
	(0.000)	(0.000)	(0.000)
EXEMPT	-0.1458	-0.1039	-0.1164
	(0.000)	(0.000)	(0.000)
AGE65	0.8278	0.5834	0.6558
	(0.000)	(0.000)	(0.000)
SEMPL	1.0873	0.8789	0.7234
	(0.000)	(0.000)	(0.000)
FORMS		0.5522	0.5431
		(0.000)	(0.000)
SCHS		0.4675	
		(0.000)	
SCHB			0.2404
			(0.000)
SCHD			0.2632
			(0.000)
SCHE			0.9220
			(0.000)
AUDIT	0.5254	0.3850	0.3464
	(0.000)	(0.000)	(0.001)
AMT	1.8849	0.9750	0.9479
	(0.000)	(0.000)	(0.000)
CCC	0.0205	-0.4993	-0.4948
	(0.805)	(0.000)	(0.000)
EIC	0.3515	0.3432	0.3373
	(0.017)	(0.022)	(0.025)
CONSTANT	0.3311	-0.6587	-0.1836
	(0.003)	(0.000)	(0.118)
Log-Likelihood	-5106.8936	-4861.8212	-4821.0546
N	8449		

of preparer use by approximately 8 percent. The AMT increases the probability of preparer use by 42, 21, and 21 percent respectively for specifications 1 through 3. For the law variables, exclusion of TPI and MTR does not provide significant changes.

Table 4-18 Moulton Correction for Audit Variable

	Clustered			Non-clustered		
	1	2	3	1	2	3
Coefficient	0.5254	0.3850	0.3464	0.5254	0.3850	0.3464
Standard Error	0.2502	0.2452	0.2376	0.0968	0.1002	0.1009
t-ratio	2.100	1.570	1.458	5.428	3.844	3.434
p-value	0.036	0.116	0.145	0.000	0.000	0.001

Conclusion

One can make few comparisons because most research focuses on the entire population and does not analyze the actions of the population most readily influenced by complexity. The 1040 taxpayer population has a higher incidence of preparer use than the entire population of taxpayers.[32] Taxpayers filing form 1040 who are married, over the age of 65, and self-employed have the largest probabilities of preparer usage. Audit though not significant at the $\rho < 0.05$ levels in every specification contributes to preparer use if clustered. The same is true for law variables. Childcare was perhaps not as strong a determinant as the earned income tax or the alternative minimum tax. In this chapter, I observe that ambiguous relationships, such as TPI and MTR, are unambiguous. It is possible that segmenting the population into individual taxpayer types, ex. Form 1040 filers or head of household filers, to disentangle the demand for tax preparation. In Chapter 5, I compare my results for the entire sample population with the results of previous research.

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[32] Chapter 5 reports the summary statistics and logit regression results for the entire population.

CHAPTER 5
EMPIRICAL RESULTS IN COMPARISON TO PREVIOUS RESEARCH

Introduction

Christian, Gupta, and Lin (1993) employ similar techniques to the ones used in Chapter 4. However, they only show results for the entire population of taxpayers in their data sample. In one section, they discuss the regression results for the inclusion of an aggregated audit variable.[1] They dismiss its use as questionable and insignificant. As shown in the previous chapter, the audit variable can provide some insight into why taxpayers choose professional tax preparation over self-preparation.

In this chapter, I compare some results to those of Christian, Gupta, and Lin. In addition, I will provide an explanation and a method to deal with the insignificance of total positive income and marginal tax rates. I will also present some results that have no counterpart with the work of Christian, Gupta, and Lin. I present three variables from their paper in this chapter, but I should preface that they do not have comparable results. They use these variables in conjunction with a balanced panel 1982-1984 and a fixed effect logit. This is not analogous to a logit for only 1994.

They include categorical variables to control for return type and a cost variable to estimate how time cost reduction factors into the decision to use a tax preparer. Using Form 1040A as a base, two dummy variables, RT1040 and RT1040EZ, control for type of tax return filed. The rationale is that taxpayers filing different forms have varying levels of complexity within their return. Therefore, there should be a negative relationship between preparer use and Form 1040EZ, while one might expect a strong positive relationship between preparer and Form 1040. Christian, Gupta, and Lin (1993) and Ashley and Segal (1997) findings support this belief.

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[1] The aggregated district audit rates are from the IRS Commissioner's Annual Report 1982-1984.

The variable COST measures the time-cost of completing a return. Taxpayers who elect to use a preparer will save the time cost. One can construct the measure from the Internal Revenue Services (IRS) estimates. For each form under the Paperwork Reduction Act notice, the IRS lists the time necessary to complete a particular form. The total time is broken down into the categories of record keeping, learning about the law or form, preparing the form, and compiling and sending the form to the IRS. Christian, Gupta, and Lin (1993) suggest that the COST variable is "a return-specific surrogate for wage rate that takes into account the differences in taxpayers' value of time."

Sample Selection

I drop observations based on data availability, as was the case in Chapter 4 Table 4-3. Since these logit regressions include all taxpayers, the 19,612 observations dropped because they did not file Form 1040 return to the model for estimation. Approximately half of the taxpayers in IMF 1994 use professional tax preparation with an average income of $41,000 and marginal tax rate of 17 percent. Three percent of them claim self-employment income. About 50 percent are married with one dependent. Almost 20 percent declare a deduction for age 65 or older. Their use of forms is not significant overall. On average, they file one schedule. Thirty-eight percent file Schedule A. Forty-two percent file Schedule B. Twenty-one percent find it necessary to file Schedule D. Twenty-three percent of sampled taxpayers used Schedule E. The average cost experienced by these taxpayers is $346.21 and about 16.5 hours of preparation time. In addition, about 70 percent of this sample subset filed Form 1040, and only 11 percent used Form 1040 EZ.

Table 5-1 Descriptive Statistics for all Taxpayers in the 1994 Individual Taxpayer Model File (n = 31,826)

Variable	Mean	Standard Deviation
PREP	0.513	0.500
TPI (x $10,000)	4.145	4.081
MTR (percent)	17.041	9.652
SEMPL	0.032	0.175
MARRIED	0.506	0.500
EXEMPT	0.573	1.351
AGE65	0.190	0.393
FORM	0.310	0.603
SCHS	1.251	1.274
SCHA	0.384	0.486
SCHB	0.421	0.494
SCHD	0.214	0.410
SCHE	0.233	0.423
COST	346.210	580.694
RT1040	0.695	0.460
RT1040EZ	0.113	0.317
AUDIT	0.724	0.246

Results

The results are in Tables 5-2 though 5-5. Specification 1 examines the effect of income, marginal tax rate, taxpayer demographics, and employment status on preparer usage. Specification 2 adds complexity by incorporating FORM and SCHS into the estimation. Specification 3 replaces SCHS with a SCHA, SCHB, SCHD, and SCHE. In Tables 5-3 and 5-4 respectively, I exclude MTR and TPI. Table 5-5 uses RT1040, RT1040EZ, and COST as explanatory variables.

Table 5-2 Logit Regression Results of Tax Preparer Usage (Two-Tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variables	1	2	3
TPI	0.1068	-0.0224	-0.0142
	(0.000)	(0.000)	(0.016)
MTR	-0.0101	-0.0099	-0.0077
	(0.000)	(0.000)	(0.000)
MARRIED	0.1947	0.1217	0.1268
	(0.000)	(0.000)	(0.000)
EXEMPT	-0.0383	-0.0243	-0.0227
	(0.004)	(0.089)	(0.116)
AGE65	1.1425	0.7559	0.7523
	(0.000)	(0.000)	(0.000)
SEMPL	1.5082	1.150	0.9857
	(0.000)	(0.000)	(0.000)
FORMS		0.5799	0.6043
		(0.000)	(0.000)
SCHS		0.5948	
		(0.000)	
SCHA			0.3464
			(0.000)
SCHB			0.5159
			(0.000)
SCHD			0.4671
			(0.000)
SCHE			1.0656
			(0.000)
CONSTANT	-0.5266	-0.7723	-0.7879
	(0.000)	(0.000)	(0.000)
Log-Likelihood	-20549.793	-18950.670	-18832.444
N	31826		

Table 5-2 Logit Regression Results

The coefficient results in Table 5-2 appear consistent with those of Christian, Gupta, and Lin (1993) Table 2 (in Panel A Columns 1 through 3) except for MTR and EXEMPT. The other variables have a positive influence on preparer use. The marginal tax rate is negative and significant at $\rho < 0.05$ level in Specification 1. This is consistent with Ashley and Segal (1997) who also find results contrary to Christian, Gupta, and Lin (1993) and Long and Caudill (1987).[2]

The number of dependents is negative for Specifications 1 through 3. Where Christian, Gupta, and Lin found that exemption is a negative factor for itemizers only, I find the same trend in the entire population of taxpayers. Using 1988 IMF data, Ashley and Segal find the same result. Perhaps, this is due to a change in how tax law deals with exemptions related to children in 1983 versus 1994.

The marginal effects are slightly different. In Specification 1, a $10,000 increase in TPI increases preparer use by 3 percent. Besides its insignificance, its effect was negligible. MARRIED is not as strong in the 1994 IMF panel. It increases preparer use by approximately 5, 3, and 3 percent respectively.

Forms and schedules have a larger impact on preparer use in 1994 than in 1983. Either this strongly supports claims of increased complexity over the years or it reflects the exclusion of Christian, Gupta, and Lin's SCHG and SCHW variables.[3] It may reflect increased complexity because Ashley and Segal perform a similar regression and do not achieve the same strong results. Forms increase preparer use by approximately 15

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[2] Ashley and Segal (1997) use a logarithmic form of total positive income because the likelihood ratio test (Greene 1993) suggests a rejection of the null hypothesis for a linear TPI. Changing TPI did not yield any significant changes in the results of the specifications presented in this chapter.

Table 5-3 Logit Regression Results of Tax Preparer Usage without MTR (Two-Tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variables	1	2	3
TPI	0.0866	-0.0411	-0.0287
	(0.000)	(0.000)	(0.000)
MARRIED	0.2059	0.1301	0.1343
	(0.000)	(0.000)	(0.000)
EXEMPT	-0.0251	-0.0112	-0.0123
	(0.056)	(0.426)	(0.384)
AGE65	1.1579	0.7707	0.7640
	(0.000)	(0.000)	(0.000)
SEMPL	1.5207	1.1655	0.9942
	(0.000)	(0.000)	(0.000)
FORMS		0.5761	0.6020
		(0.000)	(0.000)
SCHS		0.5944	
		(0.000)	
SCHA			0.3392
			(0.000)
SCHB			0.5090
			(0.000)
SCHD			0.4755
			(0.000)
SCHE			1.0735
			(0.000)
CONSTANT	-0.6331	-0.8778	-0.8692
	(0.000)	(0.000)	(0.000)
Log-Likelihood	-20564.371	-18963.27	-18839.94
N	31826		

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[3] Schedule G was for income averaging and Schedule W was a two-wage earner deduction. Schedule W may interact with married. While Christian, Gupta, and Lin used married and Schedule W, I only have married. This means that the forms and schedules impact is probably due to complexity.

percent in Specifications 1 and 2. Schedules increase preparer use by 15 percent. Individually, Schedule A increases preparer use by only 9 percent, which follows Ashley and Segal (1997) but not Christian, Gupta, and Lin (1993). Christian, Gupta, and Lin find a somewhat stronger effect for Schedule A, approximately 15 percent increase. The use of Schedule B and Schedule D increases preparer use by 13 percent and 12 percent respectively. Schedule E used for reporting rent, royalty, and partnership income increases the probability of preparer use by 27 percent.

Tables 5-3 and 5-4 Logit Regression Results

Tables 5-3 and 5-4 estimate the same specifications as in Table 5-2 except Table 5-3 excludes MTR and Table 5-4 excludes TPI. The results are somewhat unremarkable except for the insignificance of EXEMPT in Specifications 2 and 3 in Table 5-3. When the complexity measures, the coefficient for the number of dependents is not significantly different from zero. In Table 5-4, the EXEMPT coefficient is not significantly different from zero in Specification 1. Perhaps, there is a correlation between the number of exemptions and total positive income and the marginal tax rate. The correlation coefficients do not support this. Also note, that MTR becomes positive in Specification 1 in Table 5-4. This is the same as the result found in previous research but it only occurs in the absence of TPI.

The marginal effect continues to be relatively strong and positive for MARRIED, AGE65, SEMPL, FORMS, SCHS, SCHA, SCHB, SCHD, and SCHE. If TPI increases by $10,000 in Table 5-3, there is a 2 percent increase in the probability of preparer use in Specification 1. In Table 5-4, even though MTR changes sign in Specification 1, its marginal effect is small, not even 1 percent. However, married gains strength in Specification 1 in Table 5-4. Being married increases the probability of using a preparer by almost 10 percent. Since married individuals tend to have more income, I believe that the exclusion of TPI can account for this. Modeling the complexity measures in the second and third columns returns married to previous levels.

Table 5-4 Logit Regression Results of Tax Preparer Usage without TPI (Two-Tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variables	1	2	3
MTR	0.0185	-0.0149	-0.0107
	(0.000)	(0.000)	(0.000)
MARRIED	0.3933	0.0892	0.1071
	(0.000)	(0.001)	(0.000)
EXEMPT	0.0104	-0.0338	-0.0281
	(0.426)	(0.016)	(0.049)
AGE65	1.1446	0.7685	0.7568
	(0.000)	(0.000)	(0.000)
SEMPL	1.6326	1.1394	0.9775
	(0.000)	(0.000)	(0.000)
FORMS		0.5694	0.5997
		(0.000)	(0.000)
SCHS		0.5761	
		(0.000)	
SCHA			0.3238
			(0.000)
SCHB			0.5093
			(0.000)
SCHD			0.4548
			(0.000)
SCHE			1.0580
			(0.000)
CONSTANT	-0.7135	-0.7326	-0.7644
	(0.000)	(0.000)	(0.000)
Log-Likelihood	-20776.556	-18958.187	-18835.308
N	31826		

Table 5-5 Logit Regression Results

Table 5-5 does not have a comparable result in Christian, Gupta, and Lin (1993), but Ashley and Segal (1997) run a specification that includes RT1040, RT1040EZ, and COST. Yet, it is still important to compare Table 5-5 to results in Ashley and Segal's Table 3. The results are not consistent with one another. However, they are consistent with those of Ashley and Segal. TPI, MTR, MARRIED, EXEMPT, and RT1040EZ have a negative relationship with preparer use. The other explanatory variables are positive except for SCHA in Specification 3. TPI is not significant in Specification 3. The inclusion of the individual schedule measures, particularly schedule A, appears to play a part in this. Ashley and Segal posit that it is because taxpayers either did not complete the more complex portions of the schedule or did not file it at all. Married is not significant in Specification 1 but gains significance in Specifications 2 and 3.

Total positive income, marginal tax rate, married, and exempt show the same small marginal effects on preparer use. TPI has a 3 percent effect on the probability of preparer use in Specification 1. Married consistently indicates a 1 to 2 percent decrease in preparer use. In the 1994 IMF, increasing exemptions by 1 leads to a 2 percent decrease in the probability of preparer use. As with Christian, Gupta, and Lin, though positive and significant, cost has a particularly small impact on the probability of preparer use. The type of return a taxpayer is filing does matter. The probability of preparer use increases by 31 percent in Specification 1, 24 percent in Specification 2, and 26 percent in Specification 3 if a taxpayer files Form 1040. Using Form 1040EZ, decreases the probability of preparer use by an average 35 percent in all 3 specifications.

Table 5-5 Logit Regression Results of Tax Preparer Usage with Dummies for Return Type (Two-Tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variables	1	2	3
TPI	-0.1154	-0.0351	-0.0027
	(0.000)	(0.000)	(0.742)
MTR	-0.0128	-0.0196	-0.0185
	(0.000)	(0.000)	(0.000)
MARRIED	-0.0381	-0.0681	-0.0637
	(0.201)	(0.024)	(0.036)
EXEMPT	-0.0838	-0.0863	-0.0804
	(0.000)	(0.000)	(0.000)
AGE65	0.7097	0.5981	0.5467
	(0.000)	(0.000)	(0.000)
SEMPL	0.9379	0.9565	0.7787
	(0.000)	(0.000)	(0.000)
FORMS		0.3988	0.4766
		(0.000)	(0.000)
SCHS		0.3192	
		(0.000)	
SCHA			-0.1096
			(0.003)
SCHB			0.2685
			(0.000)
SCHD			0.2711
			(0.000)
SCHE			0.8372
			(0.000)
COST	0.0018	0.0004	0.0002
	(0.000)	(0.000)	(0.018)
RT1040	1.2356	0.9751	1.0473
	(0.000)	(0.000)	(0.000)
RT1040EZ	-1.4563	-1.4117	-1.4081
	(0.000)	(0.000)	(0.000)
CONSTANT	-0.6886	-0.7315	-0.7845
	(0.000)	(0.000)	(0.000)
Log-Likelihood	-18244.191	-17966.374	-17792.933
N	31826		

Conclusion

Christian, Gupta, and Lin (1993) studied tax preparation usage almost 10 years ago when the tax laws were different. Some aspects of taxpayer behavior are the same, but others are not. I provide reasons why certain taxpayers may be more or less interested in preparer usage. I also reason that having TPI and MTR with different signs seems reasonable in light of income and deduction considerations.

CHAPTER 6
CONCLUDING REMARKS

Increases in preparer use necessitate the inclusion of the preparer into the model. The tax evasion model including the tax preparer moved beyond its rudimentary treatment through the research in this dissertation. It extends the theoretical and empirical reach of tax evasion by revisiting some previous research and using new techniques to explore this area.

In Chapters 2 and 3, I solve several game theoretical models. The taxpayer maximizes utility (or minimizes tax liability), and the tax agency maximizes revenue minus audit costs. At times, the taxpayer may obtain assistance from a tax preparer to learn their taxable income. The tax agency uses its only instrument in the model to maximize revenue. It typically audits taxpayers who report low taxable income.

In Chapter 2, there are two game theoretical models examining taxpayer and tax agency behavior. The simplicity of each model suggests that these models should be base cases. However, the tax agency does not have a predetermined audit policy, which is a departure from previous research.

In the first model, all taxpayers prepare their own returns, which is analogous to the classic tax evasion model. The other model provides perfect tax advice as in Beck, Davis, and Jung (1996). Thus, the first model discusses the tax agency's audit policy if all taxpayers self-prepared and how taxpayers would report taxable income. The last model with perfect advice examines the same topics, but adding the perfect advice element allows me to examine how likely a taxpayer is to purchase advice.

The results indicate that the tax agency's audit probability is dependent on the fee charged by the preparer. The presence of advice does not change the tax agency's audit behavior if the tax laws change.

However, taxpayers do alter their reporting behavior if the tax laws change. If the government increases the low tax liability, there is a higher probability of reporting low tax liability. Alternatively, if the legislature decides to increase the high tax liability, then the probability of reporting low tax liability decreases. It is easier for the tax agency to differentiate between taxpayers with low and high tax liability. Changes in the tax laws also affect whether a taxpayer will obtain advice. If the government increases the low tax liability, taxpayers are less likely to obtain advice. Taxpayers are more likely to get advice if high tax liability increases.

As modeled in Chapter 3, the tax preparer does not remove all uncertainty. In this chapter, I construct two games where the taxpayer and tax preparer are uncertain. Suppose the tax laws are ambiguous and taxpayers obtaining advice cannot guarantee that the advice is perfect. One model has unobservable imperfect advice and the other has observable imperfect advice. When the taxpayer receives advice, she may not report as the preparer instructs with probability one. A comparison with the results in Chapter 2 provides a perspective not investigated before this dissertation.

Introducing additional uncertainty into the model provides a different result than a model with absolute certainty over tax preparer skills. In fact, if the preparer provides the taxpayer with unobservable imperfect tax advice, the results match those of when taxpayers self-prepare their returns. Yet, observable imperfect advice provides a different result. In fact, the tax agency uses a different audit policy for taxpayers who do not obtain advice and those who do obtain advice. Therefore, tax agency policies, which advocate more taxpayer and, perhaps, tax preparer education, may increase revenue.

In Chapters 4 and 5, I use the 1994 Individual Public-Use Microdata File. This data from the Internal Revenue Service allows me to examine the impact of filing status, audit probabilities, and tax law changes on preparer use. Applying new techniques to the characterization of tax preparer use, I clarify previous ambiguous results.

In Chapter 4, an empirical model investigates the characteristics of Form 1040 taxpayers who use a tax preparer. I also examine a sample population with only married taxpayers filing Form 1040 jointly. Christian, Gupta, and Lin (1993) and Ashley and Segal (1997) consider the Form 1040 taxpayers briefly. However, neither one looks at only married filers. In addition, this chapter includes an aggregated audit variable, which accounts for some possible knowledge of tax policy. Researchers look at tax laws in isolation of the preparer decision, but not in conjunction with it. Variables are included for the alternative minimum tax, childcare credit, and the earned income tax credit.

One can make few comparisons because most empirical research focuses on the entire population and does not analyze the actions of the population most readily influenced by complexity. The 1040 taxpayer population has a higher incidence of preparer use than the entire population if taxpayers. Audit is significant at the $\rho < 0.05$ levels in every model specification when I do not use clustering in the logit regression. Audit as well as the law variables contributes to preparer use.

Chapter 5 revisits the results of Christian, Gupta, and Lin (1993) and Ashley and Segal (1997). It examines the results found in their studies, which were before and after the Tax Revenue Act of 1986. The current results are for after the Revenue Reconciliation Act of 1993, which revamped several areas of the tax code.

Christian, Gupta, and Lin (1993) studied tax preparation usage almost 10 years ago when the tax laws were different. Some aspects of taxpayer behavior are the same, but others are not. I provide reasons why certain taxpayers may be more or less interested in preparer usage. I also note that having TPI and MTR with different signs seems reasonable in light of income and deduction considerations.

I would like to further extend the theoretical as well as the empirical research in the dissertation. Some future theoretical research includes adding the tax preparer to the model as an active player. In reality, tax preparers are subject to penalties like the taxpayer. This addition may change taxpayer, tax agency, and tax preparer behavior. In addition, tax agency represents the government in the games in this dissertation. I noted several times that the tax agency does not set underreporting penalties or change tax law. The tax agency simply implements the policy. Perhaps, having the government in the game maximizing social welfare may also be beneficial.

My future empirical work will examine the various segments of the taxpayer population. In the dissertation, I disentangle the characteristics of taxpayers who are more likely to use a tax preparer. Therefore, I may be able to provide characteristics for all taxpayer types in available in the Individual Public-Use Microdata File. The increasing use of technology, computer programs and electronic filing, warrants a study that examines the impact of technology on preparer use.

APPENDIX A
COMPARATIVE STATIC RESULTS

In chapter 2, the comparative static results are available for the probability of audit when all taxpayers self-prepare, the probability a taxpayer reports low taxable income when all taxpayers self-prepare, the probability of audit when perfect advice is available, and the probability that a taxpayer does not purchase advice when perfect advice is available. In Chapter 3, the comparative static results are available for the probability of probability of audit with unobservable imperfect advice, the probability a taxpayer reports low taxable income with unobservable imperfect advice, the probability that a taxpayer who purchases advice and receives a high taxable income signal will report low taxable income with observable imperfect advice, the probability of audit for taxpayers who do and do not get advice with observable imperfect advice.

In Chapters 2 and 3, I limit the discussion to changes in the tax rates and tax savings. The appendix contains comparative static results, if relevant to the probability, for the penalty rate, hassle cost, population changes, audit cost, and preparation fee. Listed below are the probability and its accompanying comparative static results.

The equilibrium strategy when all taxpayers self-prepare involves the government using a mixed strategy for auditing taxpayers. While taxpayers who are certainly have high taxable income never report low tax liability, uncertain taxpayers play a mixed strategy. Remember, the probability of audit when all taxpayers self-prepare is:[1]

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[1] The comparative static results for p_n are the same as for p_e.

$$(1)\, p_n = \frac{T}{(\alpha)(T+q)+h}$$

The probability that an uncertain taxpayer will report low tax liability is: [2]

$$(2)\, \omega^u = \frac{\delta(1-\beta)c}{(1-\delta)[\alpha(T+q)-c]}.$$

These results are somewhat more interesting because they look at audit cost and population changes as well.

When uncertain taxpayers have the option to receive perfect advice, changes in the tax rates, tax saving, preparer fee, penalty rate, hassle cost, and population may influence the tax agency's audit probability. The equilibrium for the game had taxpayers who were certain that they had high tax liability always report high. Uncertain taxpayers always report low tax liability and play a mixed strategy over purchasing advice. The tax agency plays a mixed strategy as well. Remember that:

$$(3)\, \overline{p_n} = \frac{\alpha T + f}{(\alpha)(T+q)+h}$$

is the audit probability.

I do not present extended comparative static results for the unobservable advice game because the equilibrium for that game is the same as the game when all taxpayers self-prepare their return. The probability that a taxpayer who receives a high taxable income signal will report low taxable income is:

$$(4)\, \theta = 1 - \frac{\alpha(T+q-c)-(1-\alpha)(c)}{\alpha(\gamma_H)(T+q-c)-(1-\alpha)(\gamma_L)(c)}.$$

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[2] These results can substitute for those of π (which is exactly the same) and $\overline{\overline{\omega}}^u$ (except $\beta = 0$).

The probability of audit for taxpayers who do receive advice in the observable imperfect advice game is:

$$(5)\ \hat{p}_e = \frac{[(1-\alpha)\gamma_L + \alpha\gamma_H]T}{\alpha\gamma_H(T+q)}.$$

The probability of audit for taxpayers who do not receive advice in the observable imperfect advice game is:

$$(6)\ \tilde{p}_e = \frac{[(1-\alpha)(\gamma_L) + \alpha\gamma_H]T + \gamma_H f}{\alpha\gamma_H(T+q) + \gamma_H h}.$$

Below I have a comparative static table, which I follow with a brief discussion of each result.

Table A1 Comparative Static Results

	p_n	ω^u	$\overline{p_n}$	θ	$\hat{p}_e$	$\tilde{p}_e$
t_2	+	-	+	-	+	+
t_1	-	+	-	+	-	-
T	+	-	+	-	+	+
q	-	-	-	-	-	-
h	-	0	-	0	0	-
c	0	-	0	+	0	0
δ	0	+	0	0	0	0
β	0	-	0			
α	+	-	+	-	+	+
f			+	0	0	+
γ_H				+	-	-
γ_L				-	+	+

As the government increases the high tax rate, the probability that the tax agency will audit someone who reports low tax liability increases. The opposite is true when I observe a change in the low tax rate. There is a decrease in the probability that the tax agency will audit someone who reports low tax liability. Following the results of the two previous partial derivatives, as the tax savings increases, the probability that the tax agency will audit you if you report low taxable income increases.

Suppose the penalty rate, which is observable, increases. I find a decrease in the probability of audit. Since the tax agency can collect the same amount of penalty revenue from performing fewer audits, it does that.

If taxpayers feel that having the tax agency audit them is more stressful, then the tax agency decreases the number of audits. This may seem out of place here, but this comparative static would support the IRS audit policy changes that occurred after Congressional legislation passed in late 1997.[3]

The government has the ability to change tax rates. These changes do affect an uncertain taxpayers probability of reporting low tax liability. If the government, holding all else constant, decides to increase the tax rate for those reporting high taxable income, the probability that a taxpayer report low taxable income decreases. Alternatively, suppose the government increases the low tax rate, the probability that a taxpayer will report low tax liability increases. The tax savings results follows from the two previous comparative static results. As the tax saving increases, I find a decrease in the probability of a taxpayer reporting low taxable income.

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[3] See Chapter 1 "Introduction."

In addition, there is a decrease in a taxpayer's probability of reporting low taxable income if the penalty rate increases. One might wonder if taxpayers do or should respond to changes in how much it cost the tax agency to conduct an audit. If the audit cost increases, a taxpayer's probability of reporting low increases. If the tax agency has a restricted budget, then it can only perform a limited number of audits. Since auditing not only enforces compliance but also increases overall revenue, the tax agency will audit those returns with the highest probability of error.

As the economy grows, the population's income should also adjust. If there is an increase in the percentage of taxpayers who know with certainty their true tax liability, then the probability that an uncertain taxpayer will report low tax liability increases. The change is not the same if the percentage of the population with high taxable income changes. If the percentage of the population who are certain or uncertain that they have high taxable income grows, the probability that an uncertain taxpayer will report low taxable income decreases.

If the government increases the high tax rate and the taxpayer who reports high tax liability owes more, then the audit probability decreases. If the government chooses to increase the low tax rate, this leads to an increase in the probability. Tax savings increases generate an increase in the audit probability.

If the fee, which I assumed fixed, increases, the probability of auditing a taxpayer who reports low taxable income increases. Suppose the penalty increases. The audit probability decreases. The rationale is the same as when no advice is available. The tax agency can perform fewer audits and collect the same revenue. An increase in the hassle cost has a similar effect. It leads to a decrease in the probability of audit.

Notice that the results for θ, $\hat{p}_e$, and $\tilde{p}_e$ are rather unremarkable when compared to previous comparative static results for similar measures. Therefore, I forego a lengthy discussion of their results.

APPENDIX B
FORMS USED IN EMPIRICAL MODEL

Form 1116	Foreign Tax Credit (Individuals, Fiduciary, or Non-Resident Alien)
Form 2106	Employee Business Expenses
Form 2439	Notice to Shareholder of Undistributed Long-Term Capital Gains
Form 2441	Child and Dependent Care Expenses
Form 2555	Foreign Earned Income
Form 3468	Investment Credit
Form 3903	Moving Expenses
Form 4136	Credit for Federal Tax paid on Fuels
Form 4137	Social Security and Medicare Tax on Unreported Tip Income
Form 4255	Recapture Tax of Investment Credit
Form 4684	Casualties and Thefts
Form 4797	Sales of Business Properties
Form 4835	Farm Rental Income and Expenses
Form 4868	Application for Automatic Extension of Time to File US Income Tax Return
Form 4970	Tax on Accumulation Distribution of Trusts
Form 4972	Tax on Lump-Sum Distributions
Form 5329	Additional Taxes Attributable to Qualified Retirement Plans (Including IRA, Annuities, and Modified Endowment Contracts)
Form 5884	Jobs Credit
Form 6251	Alternative Minimum Tax-Individuals
Form 6765	Credit for Increasing Research Activities
Schedule R	Credit for the Elderly or the Disabled

APPENDIX C
CHAPTER 4 MARGINAL EFFECTS

Table AC 4-1 Marginal Effects of Tax Preparer Usage for Itemized Returns (Two-Tailed p-Values of Asymptotic t-Statistics in parentheses)

Variable	1	2	3
TPI	0.0210	0.0049	0.0056
MTR	-0.0088	-0.0058	-0.0054
MARRIED	-0.0596	-0.0461	-0.0483
EXEMPT	-0.0292	-0.0255	-0.0274
AGE65	0.2249	0.1557	0.1727
SEMPL	0.3010	0.2225	0.1922
FORMS		0.1241	0.1201
SCHS		0.1094	
SCHB			0.0586
SCHD			0.0781
SCHE			0.1981
CONSTANT	0.2117	-0.0587	-0.0508

Table AC 4-2 Marginal Effects of Tax Preparer Usage for Itemized Returns excluding MTR (Two-Tailed p-Values of Asymptotic t-Statistics in parentheses)

Variable	1	2	3
TPI	0.0082	-0.0038	-0.0025
MARRIED	-0.0456	-0.0369	-0.0397
EXEMPT	-0.0217	-0.0201	-0.0224
AGE65	0.2475	0.1678	0.1851
SEMPL	0.3168	0.2302	0.1983
FORMS		0.1250	0.1208
SCHS		0.1146	
SCHB			0.0593
SCHD			0.0850
SCHE			0.2059
CONSTANT	0.0833	-0.1529	-0.0314

Table AC 4-3 Marginal Effects of Tax Preparer Usage for Itemized Returns excluding TPI (Two-Tailed p-Values of Asymptotic t-Statistics in parentheses)

Variable	1	2	3
MTR	-0.0015	-0.0041	-0.0035
MARRIED	-0.0192	-0.0372	-0.0383
EXEMPT	-0.0211	-0.0234	-0.0250
AGE65	0.2400	0.1559	0.1726
SEMPL	0.3405	0.2278	0.1984
FORMS		0.1258	0.1222
SCHS		0.1141	
SCHB			0.0639
SCHD			0.0846
SCHE			0.2022
CONSTANT	0.1554	-0.0809	0.0313

Table AC 4-4 Marginal Effects of Tax Preparer Usage for Itemized Returns with audit variable (Two-Tailed p-Values of Asymptotic t-Statistics in parentheses)

Variable	1	2	3
TPI	0.0205	-0.0047	-0.0054
MTR	-0.0085	-0.0056	-0.0052
MARRIED	-0.0571	-0.0443	-0.0468
EXEMPT	-0.0292	-0.0255	-0.0273
AGE65	0.2226	0.1545	0.1714
SEMPL	0.3015	0.2228	0.1929
FORMS		0.1223	0.1186
SCHS		0.1090	
SCHB			0.0599
SCHD			0.0771
SCHE			0.1963
AUDIT	0.1088	0.0736	0.0658
CONSTANT	0.1282	-0.1136	0.0012

Table AC 4-5 Marginal Effects of Tax Preparer Usage for Itemized Returns with law variables (Two-Tailed p-Values of Asymptotic t-Statistics in parentheses)

Variable	3	3	3
TPI	0.0034	-0.0036	
MTR	-0.0046		-0.0035
MARRIED	-0.0387	-0.0303	-0.0325
EXEMPT	-0.0229	-0.0189	-0.0214
AGE65	0.1670	0.1777	0.1669
SEMPL	0.1687	0.1728	0.1720
FORMS	0.1058	0.1063	0.1066
SCHB	0.0483	0.0488	0.0513
SCHD	0.0717	0.0773	0.0755
SCHE	0.1839	0.1902	0.1861
AMT	0.2272	0.2324	0.2315
CCC	-0.0952	-0.0987	-0.0964
EITC	0.0516	0.0662	0.0509
CONSTANT	0.0498	-0.0214	0.0384

Table AC 4-6 Marginal Effects of Tax Preparer Usage for Itemized Returns with audit and law variables (Two-Tailed p-Values of Asymptotic t-Statistics in parentheses)

Variable	3	3	3
TPI	0.0031	-0.0036	
MTR	-0.0044		-0.0034
MARRIED	-0.0369	-0.0288	-0.0311
EXEMPT	-0.0228	-0.0190	-0.0214
AGE65	0.1656	0.1756	0.1654
SEMPL	0.1687	0.1725	0.1717
FORMS	0.1038	0.1041	0.1044
SCHB	0.0496	0.0501	0.0523
SCHD	0.0706	0.0758	0.0741
SCHE	0.1817	0.1875	0.1836
AUDIT	0.0725	0.0787	0.0738
AMT	0.2302	0.2355	0.2343
CCC	-0.0953	-0.0986	-0.0964
EITC	0.0522	0.0662	0.0516
CONSTANT	-0.0048	-0.0774	-0.0163

Table AC 4-7 Marginal Effects of Tax Preparer Usage for Itemizers who are Married Filing Jointly (Two-tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	1	2	3
TPI	0.0206	0.0039	0.0047
MTR	-0.0096	-0.0064	-0.0058
EXEMPT	-0.0312	-0.0272	-0.0300
AGE65	0.2039	0.1349	0.1514
SEMPL	0.2988	0.2187	0.1820
FORMS		0.1319	0.1283
SCHS		0.1153	
SCHB			0.0611
SCHD			0.0667
SCHE			0.2207
CONSTANT	0.1781	-0.0967	0.0139

Table AC 4-8 Marginal Effects of Tax Preparer Usage for Itemizers who are Married Filing Jointly with audit variable (Two-tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	1	2	3
TPI	0.0203	0.0038	0.0047
MTR	-0.0093	-0.0062	-0.0057
EXEMPT	-0.0311	-0.0271	-0.0299
AGE65	0.2015	0.1337	0.1502
SEMPL	0.2995	0.2189	0.1826
FORMS		0.1299	0.1267
SCHS		0.1149	
SCHB			0.0626
SCHD			0.0655
SCHE			0.2190
AUDIT	0.1165	0.0783	0.0700
CONSTANT	0.0898	-0.1545	-0.0383

Table AC 4-9 Marginal Effects of Tax Preparer Usage for Itemizers who are Married Filing Jointly with law variables (Two-tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	1	2	3	3	3
TPI	0.0138	0.0017	0.0025	-0.0046	
MTR	-0.0080	-0.0054	-0.0048		-0.0039
EXEMPT	-0.0329	-0.0231	-0.0258	-0.0229	-0.0250
AGE65	0.1876	0.1303	0.1459	0.1524	0.1451
SEMPL	0.2447	0.1950	0.1594	0.1635	0.1617
FORMS		0.1247	0.1218	0.1225	0.1224
SCHS		0.1040			
SCHB			0.0514	0.0511	0.0534
SCHD			0.0594	0.0645	0.0621
SCHE			0.2053	0.2116	0.2069
AMT	0.4215	0.2120	0.2059	0.2102	0.2086
CCC	0.0077	-0.1106	-0.1090	-0.1138	-0.1103
EITC	0.0780	0.0757	0.0742	0.0914	0.0738
CONSTANT	0.1636	-0.0832	0.0162	-0.0479	0.0107

Table 4-10 Marginal Effects of Tax Preparer Usage for Itemizers who are Married Filing Jointly with audit and Law Variables (Two-tailed p-Values of Asymptotic t-Statistics in Parentheses)

Variable	1	2	3
TPI	0.0135	0.0016	0.0024
MTR	-0.0076	-0.0051	-0.0047
EXEMPT	-0.0327	-0.0230	-0.0257
AGE65	0.1854	0.1290	0.1445
SEMPL	0.2435	0.1944	0.1594
FORMS		0.1221	0.1197
SCHS		0.1034	
SCHB			0.0530
SCHD			0.0580
SCHE			0.2032
AUDIT	0.1177	0.0851	0.0763
AMT	0.4221	0.2156	0.2089
CCC	0.0046	-0.1104	-0.1090
EITC	0.0787	0.0759	0.3373
CONSTANT	0.0742	-0.1457	-0.1836

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BIOGRAPHICAL SKETCH

Raymonda L. Burgman was born April 6, 1973, in West Palm Beach, FL. She received her BA in economics at New College of Florida in Sarasota, FL. In June 1995, she began her graduate work at the University of Florida. Raymonda received her MA in economics in August 1998 from the university. At the University of Florida, she was a Graduate Minority Fellow and participated in a Faculty Diversity Program between the University of Florida and Santa Fe Community College, where she accepted a full-time instructor position during the 1999-2000 academic year. In August 2001, Raymonda accepted a pre-doctoral teaching fellowship with the Consortium for a Stronger Minority Presence in Liberal Arts Institutions. She held the fellowship in residence at DePauw University in Greencastle, IN. In August 2002, she will receive her Ph.D. in economics.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Jonathan H. Hamilton, Chairman
Professor of Economics

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Steven M. Slutsky
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